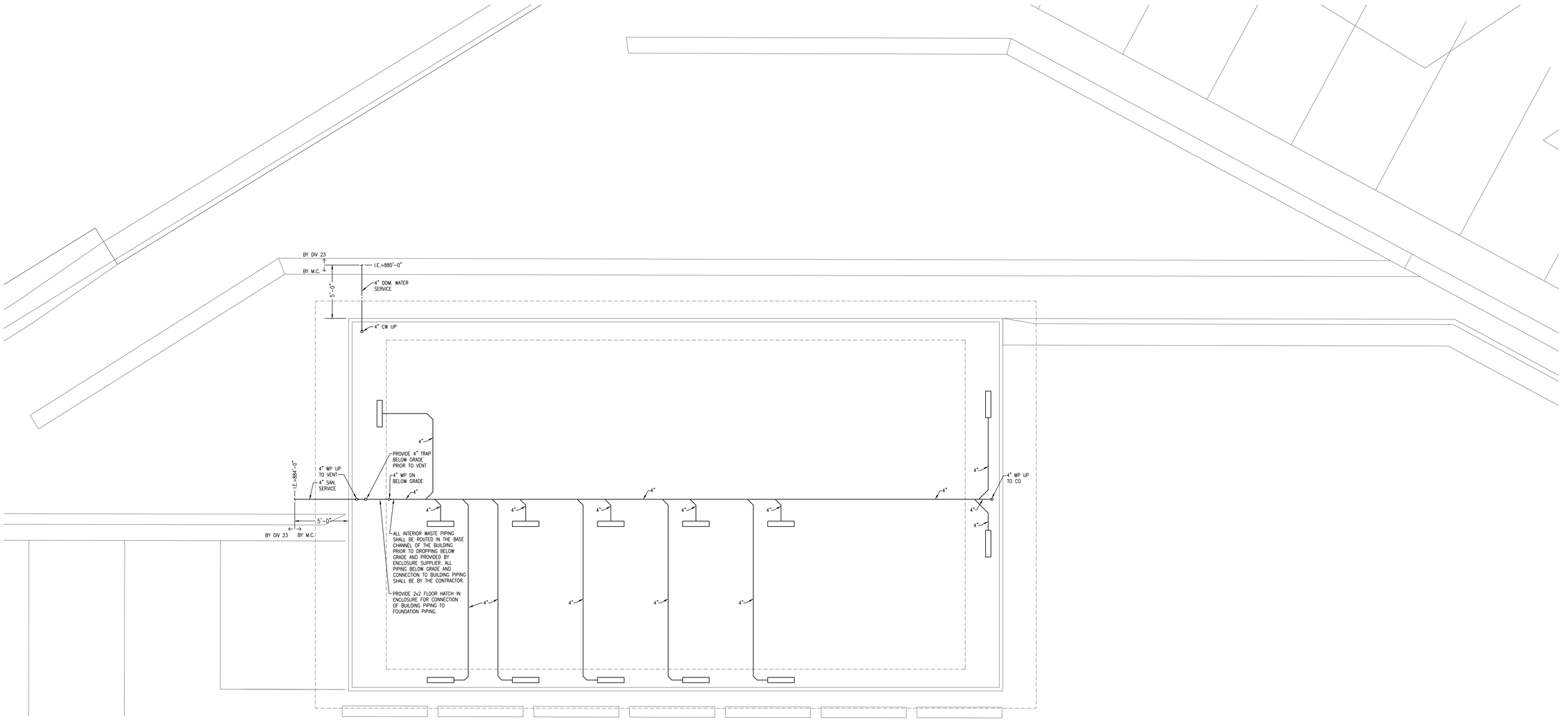
PLUMBING NOTES:

A. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK AND NOTIFY THE ARCHITECT/ ENGINEER OF ANY DISCREPANCIES BETWEEN THE "AS-BUILT" CONDITIONS AND THESE DRAWINGS.

B. COORDINATE ALL PLUMBING INSTALLATION WITH GENERAL, FIRE PROTECTION, VENTILATION, AND ELECTRICAL CONTRACTORS. INSTALL ALL PLUMBING PIPING AS HIGH AS POSSIBLE. PROVIDE ALL NECESSARY OFFSETS (DROPS AND RISES) TO KEEP PLUMBING PIPING TIGHT TO THE STRUCTURE OR DUCTWORK ABOVE. OFFSET PLUMBING PIPING TO AVOID BEAMS AND INSTALLATION BY ALL TRADES.

C. MAINTAIN 3'-0" CLEAR SPACE IN FRONT OF ALL ELECTRICAL, CONTROL, AND ACCESS PANELS FOR ACCESSIBILITY.

D. ALL SHUT-OFF VALVES, ETC... SHALL BE INSTALLED IN ACCESSIBLE LOCATIONS.



1 P1 FOUNDATION PLUMBING PLAN - CHILLER PLANT
1/4"=1'-0"

Revisions	Date

Dept. of Veterans Affairs
Health Care System
2101 Elm Street North
Fargo, ND 58102

IMAGE GROUP INC.
403 CENTER AVENUE, SUITE 300
MOORHEAD, MN 56560

ONE
Fargo ▪ Grand Forks ▪ Bismarck
Alexandria ▪ Minneapolis ▪ 877.380.0501

IMAGE GROUP INC., Architecture & Interiors
OBERMILLER NELSON ENGINEERING, Mechanical Engineers
MBN ENGINEERING, Civil & Electrical Engineers
SOLIEN & LARSON ENGINEERING, Structural Engineers

PROFESSIONAL ENGINEER
JOEL O. PECK
PE - 6847
DATE 12/18/2015
NORTH DAKOTA

Drawing Title: FOUNDATION PLUMBING PLAN - CHILLER PLANT		Project Title: REPLACE CENTRAL CHILLER PLANT	Date: DECEMBER 18, 2015
			Scale: AS SHOWN
VA Project No.: 437-14-111	Contract No.: VA263-P-1217 / VA263-C-	Designed By: JCP / Checked By: JCP / Drawn By: JAF	Drawing No.: P1
Building No.: 56	AutoCAD File Name: 2013282-12-P1.dwg	Location: FARGO VA HEALTH CARE SYSTEM FARGO, ND	Dwg. 10 of 26

Department of Veterans Affairs

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PLUMBING FIXTURE ROUGH-IN CONNECTION SCHEDULE

FIXTURE	WASTE	VENT	CW	HW
WALL HYDRANT	–	–	3/4"	–
CLEAN OUT	4"	–	–	–
TRENCH DRAIN	4"	2"	–	–
EMERG. EYE WASH	2"	1-1/2"	1/2"	1/2"
EMERG. EYE WASH/SHOWER	2"	1-1/2"	1"	1"
MIXING VALVE	–	–	3/4"	3/4"
MIXING FAUCET	–	–	3/4"	3/4"

NOTES:
1. SIZES SHALL BE AS SCHEDULED UNLESS OTHERWISE NOTED ON DRAWINGS.

PLUMBING NOTES:

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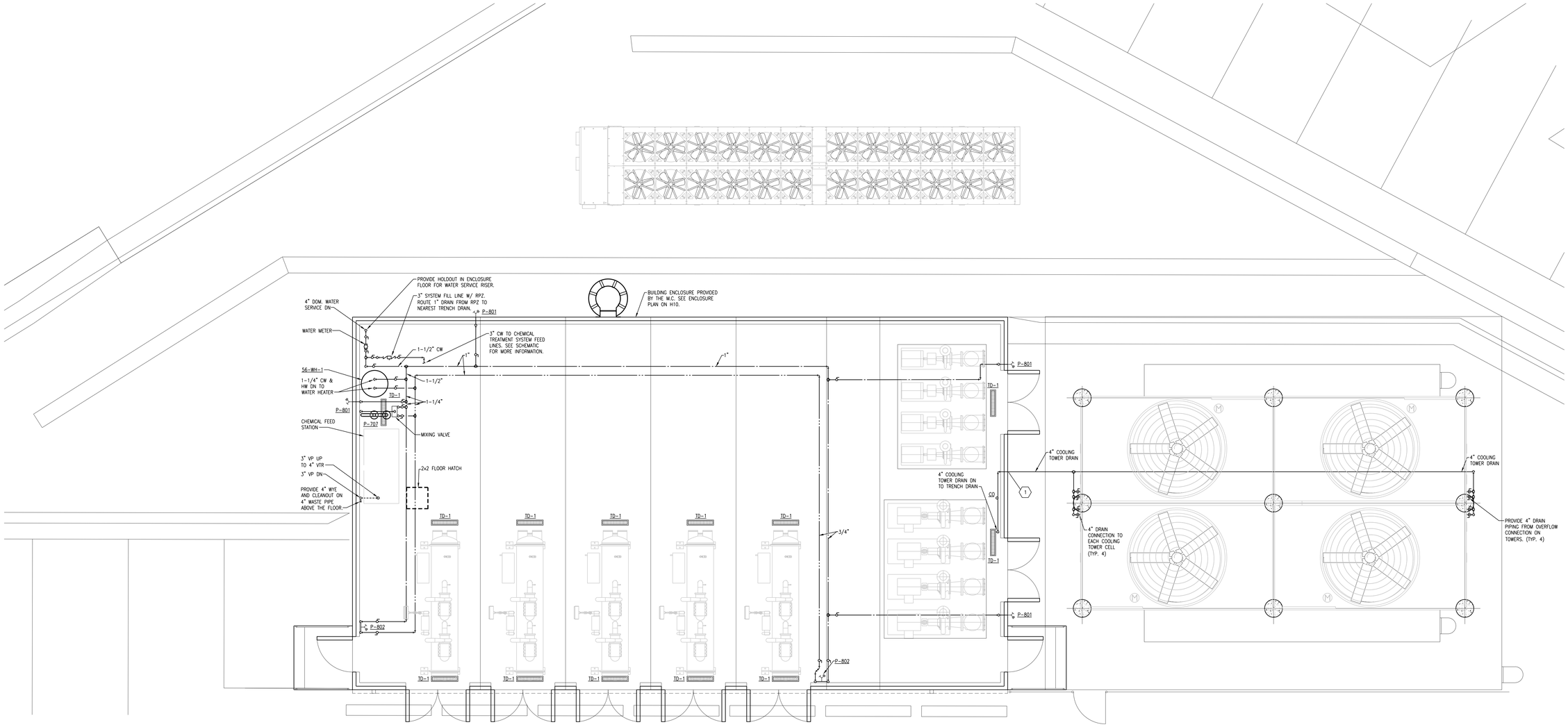
B. COORDINATE ALL PLUMBING INSTALLATION WITH GENERAL, FIRE PROTECTION, VENTILATION, AND ELECTRICAL CONTRACTORS. INSTALL ALL PLUMBING PIPING AS HIGH AS POSSIBLE. PROVIDE ALL NECESSARY OFFSETS (DROPS AND RISES) TO KEEP PLUMBING PIPING TIGHT TO THE STRUCTURE OR DUCTWORK ABOVE. OFFSET PLUMBING PIPING TO AVOID BEAMS AND INSTALLATION BY ALL TRADES.

C. MAINTAIN 3'-0" CLEAR SPACE IN FRONT OF ALL ELECTRICAL, CONTROL, AND ACCESS PANELS FOR ACCESSIBILITY.

D. ALL SHUT-OFF VALVES, ETC... SHALL BE INSTALLED IN ACCESSIBLE LOCATIONS.

(1) ALL DRAIN PIPING ON THE EXTERIOR OF THE BUILDING SHALL BE PROVIDED BY THE CONTRACTOR. ALL PIPING INSIDE THE BUILDING AND PENETRATION THROUGH THE EXTERIOR WALL SHALL BE PROVIDED BY THE ENCLOSURE SUPPLIER.



1 / P2 PLUMBING PLAN - CHILLER PLANT
1/4"=1'-0"

Revisions	Date

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Health Care System
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IMAGE GROUP INC., Architecture & Interiors
OBERMILLER NELSON ENGINEERING, Mechanical Engineers
MBN ENGINEERING, Civil & Electrical Engineers
SOLIEN & LARSON ENGINEERING, Structural Engineers

JOEL C. PECK
PE - 6847
DATE 12/18/2015
REGISTERED PROFESSIONAL ENGINEER
NORTH DAKOTA

Drawing Title	PLUMBING PLANS - CHILLER PLANT
Project Title	REPLACE CENTRAL CHILLER PLANT
Date	DECEMBER 18, 2015
Scale	AS SHOWN
VA Project No.	437-14-111
Contract No.	VA263-P-1217 VA263-C-
Designed By	JCP
Checked By	JCP
Drawn By	JAF
Drawing No.	P2
Building No.	56
AutoCAD File Name	20132B2-12-P2.dwg
Location	FARGO VA HEALTH CARE SYSTEM FARGO, ND
	Dwg. 11 of 26

Department of Veterans Affairs

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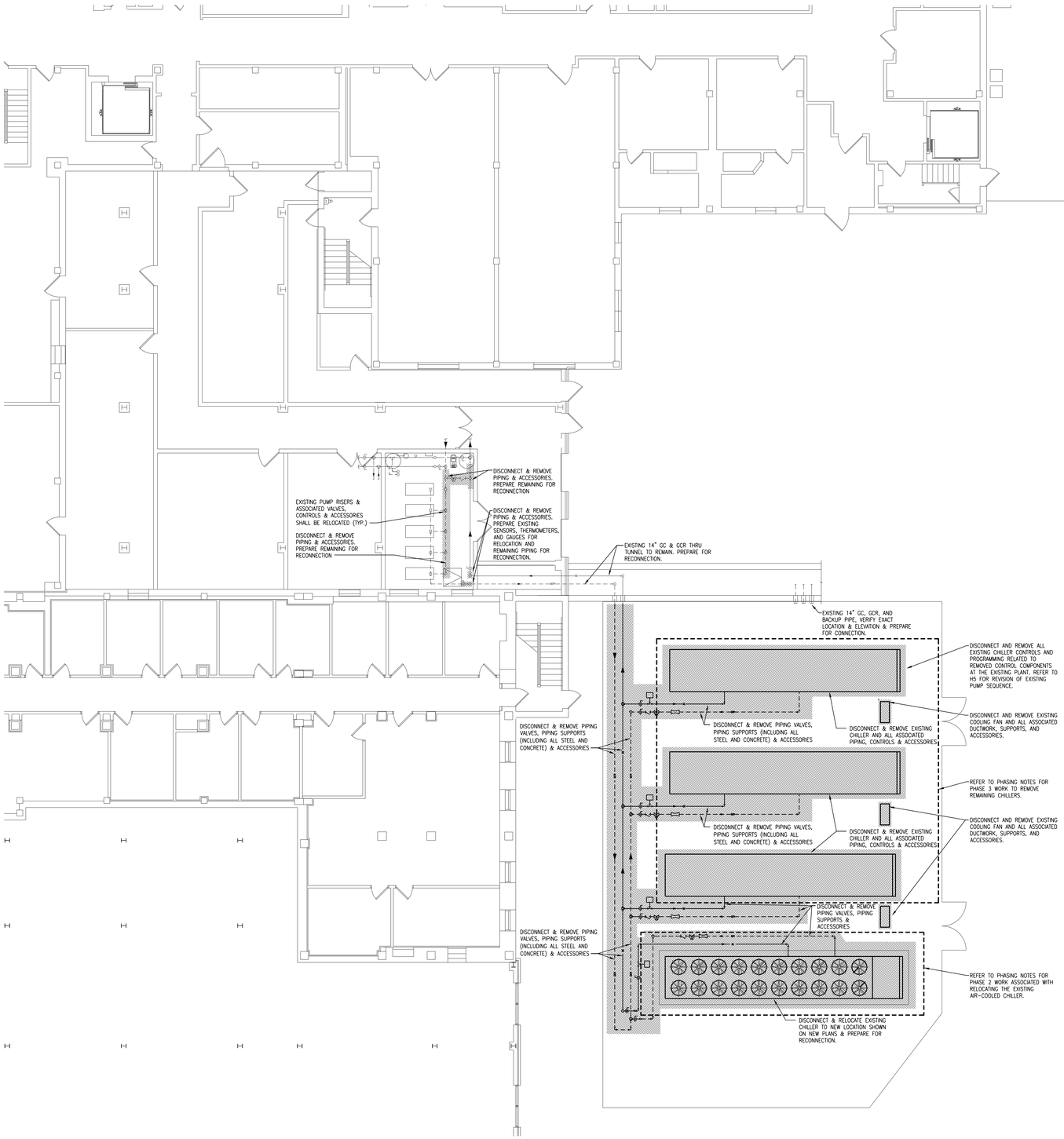


1 / H1 HVAC PIPING DEMOLITION PLAN
1/8"=1'-0"

HVAC PIPING DEMOLITION NOTES:

A. DEMOLITION DRAWINGS ARE DIAGRAMMATIC ONLY AND ARE BASED ON FIELD OBSERVATION AND EXISTING RECORD DRAWINGS. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK AND NOTIFY THE ARCHITECT/ ENGINEER OF ANY DISCREPANCIES BETWEEN THE "AS-BUILT" CONDITIONS AND THESE DRAWINGS. PROVIDE ADDITIONAL DEMOLITION AS REQUIRED BASED ON FIELD CONDITIONS.

B. THIS CONTRACTOR SHALL OPEN ALL WALLS FOR DEMOLITION OF EXISTING HVAC PIPING, EQUIPMENT, ETC. AS REQUIRED.

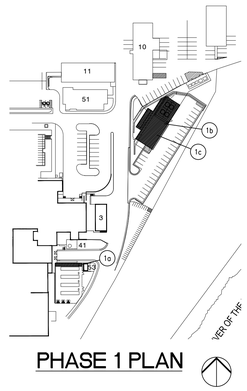
C. THIS CONTRACTOR IS RESPONSIBLE FOR PATCHING ALL HOLES/WALLS FROM DEMOLISHED HVAC PIPING, EQUIPMENT, ETC. IN FLOORS, WALLS, AND CEILINGS TO MATCH EXISTING.

PHASING NOTES:

1. PRIOR TO DEMOLITION OF THE EXISTING CHILLERS AND THEIR ASSOCIATED PIPING, THE NEW CHILLER PLANT CONSTRUCTION SHALL BE COMPLETED AND TESTED ALONG WITH ALL TRAINING ON THE NEW EQUIPMENT. CAREFULLY COORDINATE ALL EXISTING CHILLER SHUTDOWNS AND PIPING CONNECTIONS TO EXISTING SYSTEM A MINIMUM OF 1 MONTH IN ADVANCE WITH THE OWNER. ANY SHUTDOWNS SHALL OCCUR DURING THE HEATING SEASON.

2. ALL WORK REQUIRED IN THE EXISTING CHILLER PUMP ROOM SHALL BE COMPLETED DURING THE HEATING SEASON AND NOT UNTIL THE NEW CHILLER PLANT IS READY TO BE PUT INTO OPERATION.

3. ANY REQUIRED DRAINING AND FILLING OF THE EXISTING SYSTEM SHALL BE COMPLETED ONLY DURING THE HEATING SEASON. SYSTEM SWITCHOVER TO THE NEW CHILLER PLANT SHALL BE DURING THE HEATING SEASON AFTER THE NEW PLANT IS OPERATIONAL AND OWNER TRAINING IS COMPLETE. THERE SHALL BE NO LOSS OF CHILLED WATER DURING THE COOLING SEASON.

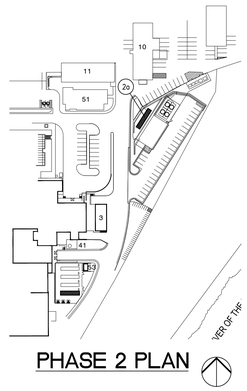


PHASE 1 PLAN

1a CONSTRUCT NEW CHILLER PLANT AND CONNECT TO EXISTING BURIED CHILLED WATER PIPING.

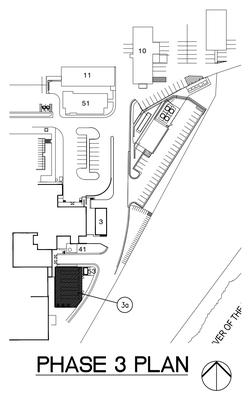
1b PROVIDE TEMPORARY CONNECTION FOR TIE-IN OF EXISTING CHILLERS AND WORK IN EXISTING PUMP ROOM. REFER TO SHEET H5 FOR PIPING WORK AT EXISTING PLANT. THIS WORK CAN ONLY OCCUR DURING THE HEATING SEASON.

1c NEW CHILLER PLANT SHALL BE TESTED/COMMISSIONED AND PROVEN TO BE OPERATIONAL TO THE SATISFACTION OF THE VA AND A/E PRIOR TO START OF PHASE 2.



PHASE 2 PLAN

2a RELOCATE THE EXISTING AIR-COOLED CHILLER TO THE NEW CHILLER PLANT. THIS WORK SHALL ONLY OCCUR DURING THE HEATING SEASON.



PHASE 3 PLAN

3a REMOVE THE EXISTING 3 REMAINING AIR-COOLED CHILLERS ONCE THE NEW CHILLER PLANT IS TESTED/COMMISSIONED AND PROVEN TO BE OPERATIONAL TO THE SATISFACTION OF THE VA AND A/E.

Revisions	Date

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Health Care System
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IMAGE GROUP INC., Architecture & Interiors
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MBN ENGINEERING, Civil & Electrical Engineers
SOLIEN & LARSON ENGINEERING, Structural Engineers

PROFESSIONAL ENGINEER — JOEL C. PECK — PE - 6847 — DATE 12/18/2015 — NORTH DAKOTA

Drawing Title	HVAC PIPING DEMOLITION PLAN AND PHASING PLAN
Project Title	REPLACE CENTRAL CHILLER PLANT
Date	DECEMBER 18, 2015
Scale	AS SHOWN
VA Project No.	437-14-111
Contract No.	VA263-P-1217 VA263-C-
Designed By	JCP
Checked By	JCP
Drawn By	JAF
Drawing No.	H1
Building No.	56
AutoCAD File Name	2013282-13-H1.dwg
Location	FARGO VA HEALTH CARE SYSTEM FARGO, ND
Dwg. 12 of 26	

Department of Veterans Affairs

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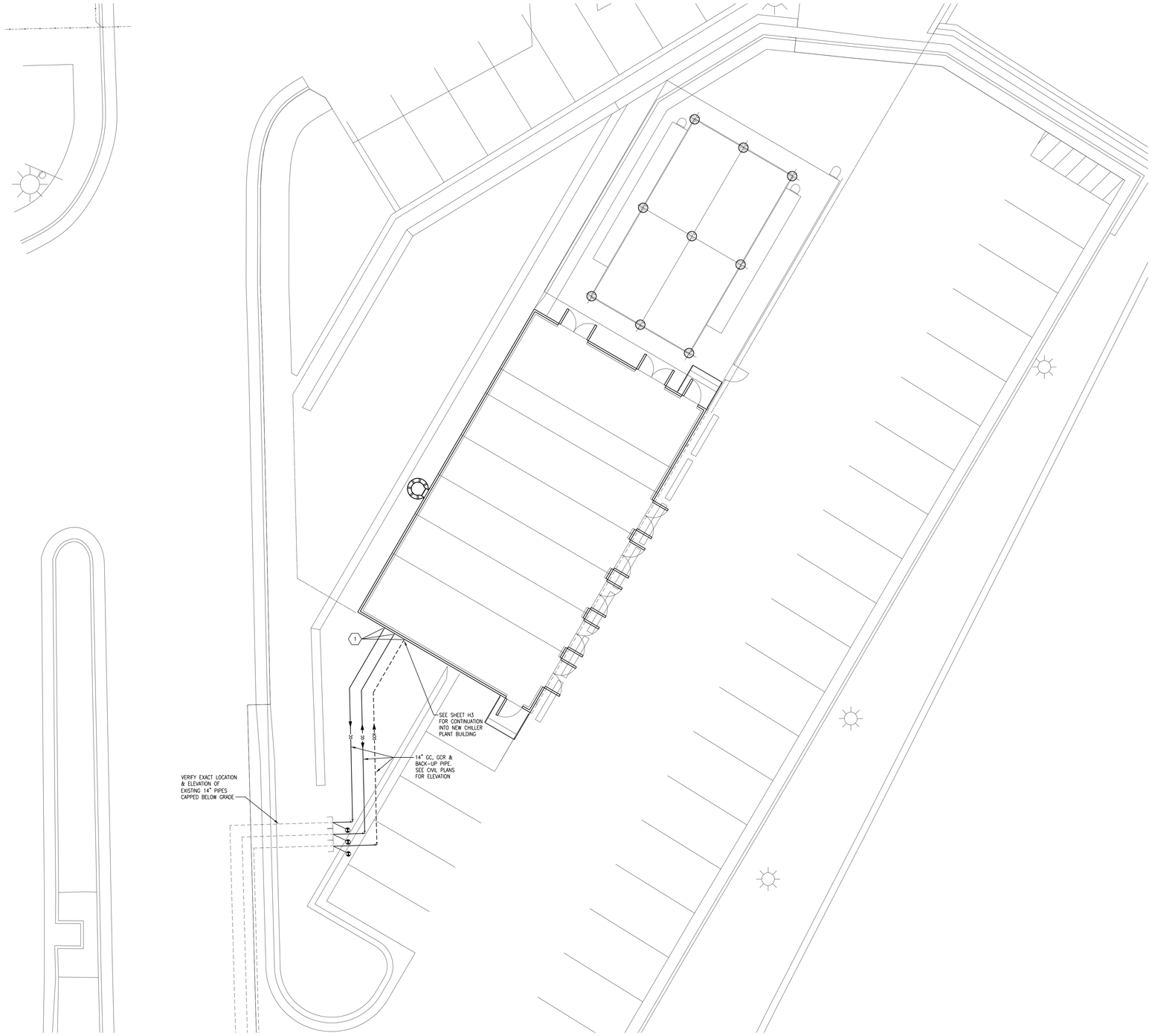
HVAC PIPING NOTES:

A. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK AND NOTIFY THE ARCHITECT/ ENGINEER OF ANY DISCREPANCIES BETWEEN THE "AS-BUILT" CONDITIONS AND THESE DRAWINGS.

B. COORDINATE ALL HVAC PIPING INSTALLATION WITH GENERAL, PLUMBING, FIRE PROTECTION, VENTILATION, AND ELECTRICAL CONTRACTORS. INSTALL ALL HVAC PIPING AS HIGH AS POSSIBLE. PROVIDE ALL NECESSARY OFFSETS (DROPS AND RISES) TO KEEP HVAC PIPING TIGHT TO THE STRUCTURE OR DUCTWORK ABOVE. OFFSET HVAC PIPING TO AVOID BEAMS AND INSTALLATION BY ALL TRADES.

(1) PROVIDE LINK RUBBER SEAL FOR PIPING PENETRATION THROUGH FOUNDATION WALL BELOW ENCLOSURE. COORDINATE HEIGHT OF FOOTINGS AND ROUTE PIPING ABOVE TOP OF FOOTINGS. PROVIDE ALL NECESSARY OFFSETS AS REQUIRED.



1/H2 HVAC PIPING SITE PLAN
1/8"=1'-0"

Revisions	Date

Dept. of Veterans Affairs
Health Care System
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Fargo, ND 58102

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MOORHEAD, MN 56560

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PROFESSIONAL ENGINEER — JOEL C. PECK — PE - 6847 — DATE 12/18/2015 — NORTH DAKOTA

Drawing Title: HVAC PIPING SITE PLAN		Project Title: REPLACE CENTRAL CHILLER PLANT			Date: DECEMBER 18, 2015
					Scale: AS SHOWN
VA Project No.: 437-14-111	Contract No.: VA263-P-1217 / VA263-C-	Designed By: JCP	Checked By: JCP	Drawn By: JAF	Drawing No.: H2
Building No.: 56	AutoCAD File Name: 2013282-14-H2.dwg	Location: FARGO VA HEALTH CARE SYSTEM FARGO, ND			Dwg. 13 of 26

Department of Veterans Affairs

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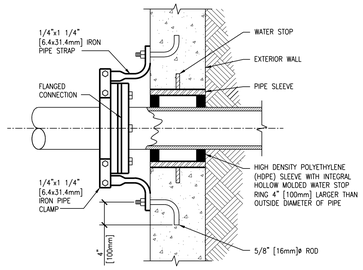
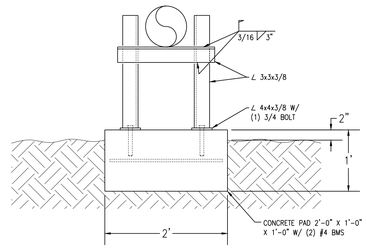


SUPPORT ANCHOR (CONDENSER WATER OR CHILLED WATER)

3 / H3 NO SCALE



PIPING SUPPORT DETAIL

2 / H3 NTS

PHASING NOTES:

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2. ALL WORK REQUIRED IN THE EXISTING CHILLER PUMP ROOM SHALL BE COMPLETED DURING THE HEATING SEASON AND NOT UNTIL THE NEW CHILLER PLANT IS READY TO BE PUT INTO OPERATION.
3. ANY REQUIRED DRAINING AND FILLING OF THE EXISTING SYSTEM SHALL BE COMPLETED ONLY DURING THE HEATING SEASON. SYSTEM SWITCHOVER TO THE NEW CHILLER PLANT SHALL BE DURING THE HEATING AFTER THE NEW PLANT IS OPERATIONAL AND OWNER TRAINING IS COMPLETE. THERE SHALL BE NO LOSS OF CHILLED WATER DURING THE COOLING SEASON.
4. SEE SHEET H1 FOR PHASING NOTES AND PLANS.

HVAC PIPING NOTES:

A. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK AND NOTIFY THE ARCHITECT/ ENGINEER OF ANY DISCREPANCIES BETWEEN THE "AS-BUILT" CONDITIONS AND THESE DRAWINGS.

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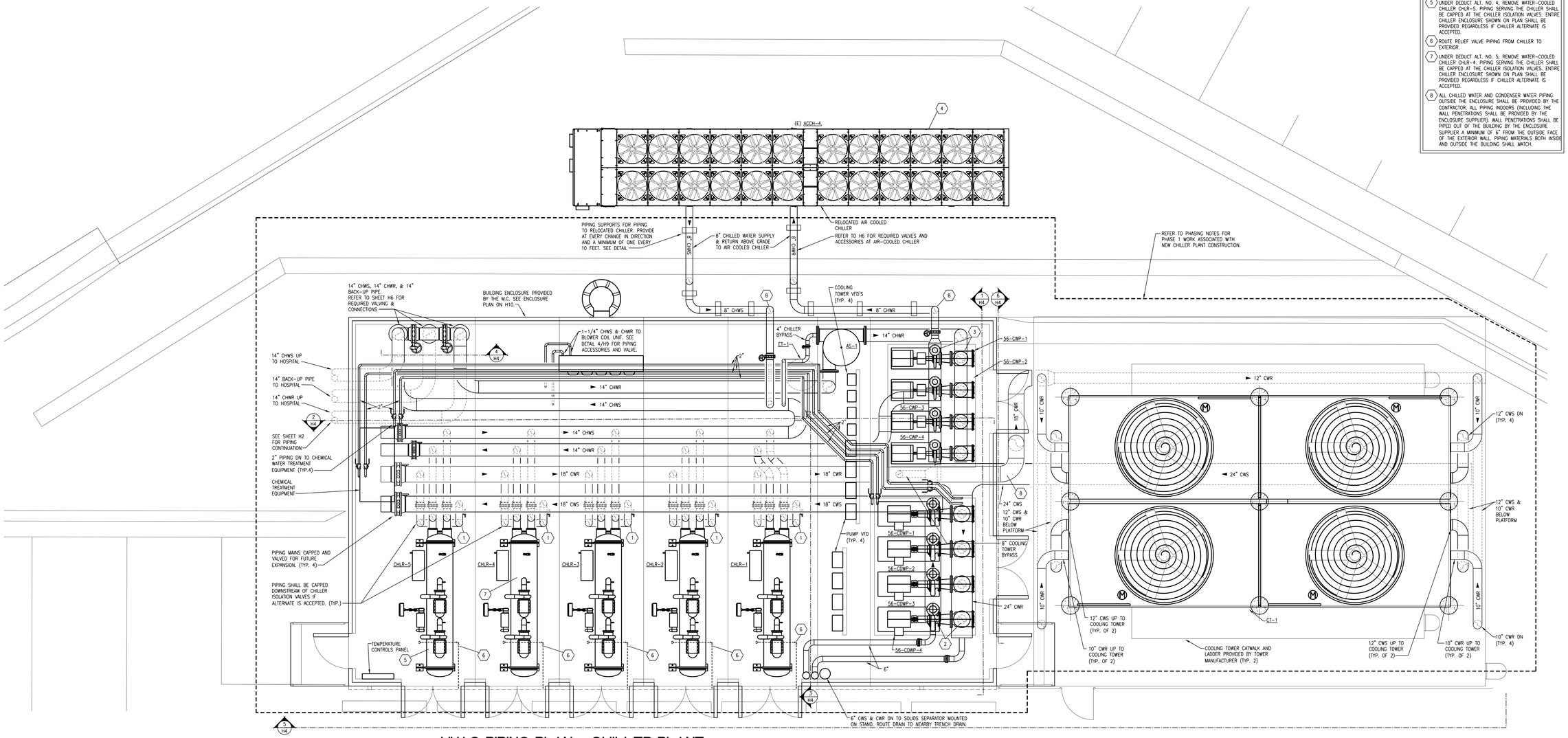
C. MAINTAIN 3'-0" CLEAR SPACE IN FRONT OF ALL ELECTRICAL, CONTROL, AND ACCESS PANELS FOR ACCESSIBILITY.

D. ALL SHUT-OFF VALVES, CONTROL VALVES, STRAINERS, ETC., SHALL BE INSTALLED IN ACCESSIBLE CEILINGS. VALVES SHALL BE LOCATED NOT MORE THAN 2 FEET ABOVE ADJUSTICAL CEILINGS.

E. SHUT-OFF VALVES FOR ALL DEVICES SHALL BE AS ACCESSIBLE AS POSSIBLE TO THE CONTROLLED DEVICE. REFER TO PIPING SCHEMATIC FOR ADDITIONAL VALVE LOCATIONS.

F. PROVIDE 1" DRAIN VALVE AT ALL LOW POINTS OF EACH SYSTEM TO ENABLE COMPLETE DRAINAGE. PROVIDE 1/2" VENT VALVES AT ALL HIGH POINTS OF EACH SYSTEM TO ENABLE COMPLETE VENTING.

1. 8" CHWS/CHWR AND 8" CWS/CWR DN TO CHILLER.
2. 10" CWS/CWR DN TO EACH PUMP (TYP.)
3. 10" CHWS/CHWR DN TO EACH PUMP (TYP.)
4. RELOCATED AIR-COOLED CHILLER.
5. UNDER DEDUCT ALT. NO. 4, REMOVE WATER-COOLED CHILLER CHLR-5, PIPING SERVING THE CHILLER SHALL BE CAPPED AT THE CHILLER ISOLATION VALVES. ENTIRE CHILLER ENCLOSURE SHOWN ON PLAN SHALL BE PROVIDED REGARDLESS IF CHILLER ALTERNATE IS ACCEPTED.
6. ROUTE RELIEF VALVE PIPING FROM CHILLER TO EXTERIOR.
7. UNDER DEDUCT ALT. NO. 5, REMOVE WATER-COOLED CHILLER CHLR-4, PIPING SERVING THE CHILLER SHALL BE CAPPED AT THE CHILLER ISOLATION VALVES. ENTIRE CHILLER ENCLOSURE SHOWN ON PLAN SHALL BE PROVIDED REGARDLESS IF CHILLER ALTERNATE IS ACCEPTED.
8. ALL CHILLED WATER AND CONDENSER WATER PIPING OUTSIDE THE ENCLOSURE SHALL BE PROVIDED BY THE CONTRACTOR. ALL PIPING INDOORS (INCLUDING THE WALL PENETRATIONS SHALL BE PROVIDED BY THE ENCLOSURE SUPPLIER). WALL PENETRATIONS SHALL BE PIPED OUT OF THE BUILDING BY THE ENCLOSURE SUPPLIER A MINIMUM OF 6" FROM THE OUTSIDE FACE OF THE EXTERIOR WALL. PIPING MATERIALS BOTH INSIDE AND OUTSIDE THE BUILDING SHALL MATCH.



HVAC PIPING PLAN - CHILLER PLANT

1 / H3 1/4"=1'-0"

Revisions	Date

Dept. of Veterans Affairs
Health Care System
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JOEL C. PECK PE - 6847 DATE 12/18/2015 PROFESSIONAL ENGINEER NORTH DAKOTA

Drawing Title	HVAC PIPING PLAN - CHILLER PLANT
Project Title	REPLACE CENTRAL CHILLER PLANT
Date	DECEMBER 18, 2015
Scale	AS SHOWN
VA Project No.	437-14-111
Contract No.	VA263-P-1217 VA263-C-
Designed By	JCP
Checked By	JCP
Drawn By	JAF
Drawing No.	H3
Building No.	56
AutoCAD File Name	2013282-15-H3.dwg
Location	FARGO VA HEALTH CARE SYSTEM FARGO, ND
Dwg. 14 of 26	

Department of Veterans Affairs

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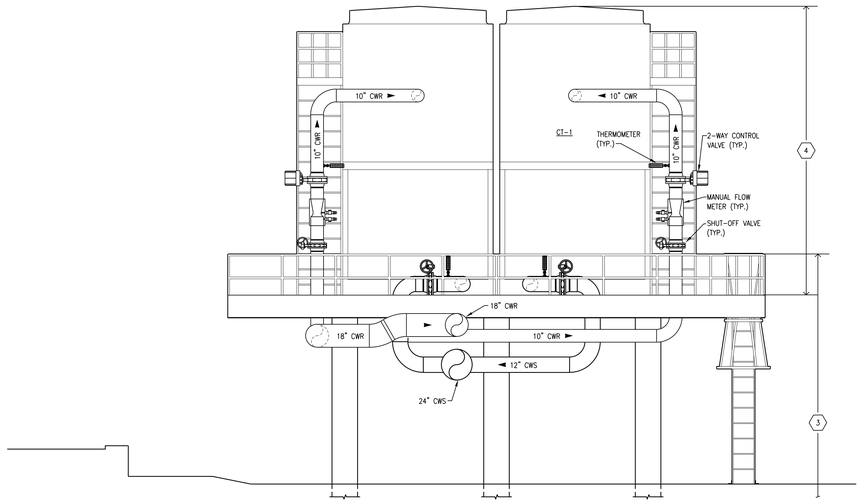
C. MAINTAIN 3'-0" CLEAR SPACE IN FRONT OF ALL ELECTRICAL, CONTROL, AND ACCESS PANELS FOR ACCESSIBILITY.

D. ALL SHUT-OFF VALVES, CONTROL VALVES, STRAINERS, ETC... SHALL BE INSTALLED IN ACCESSIBLE CEILINGS. VALVES SHALL BE LOCATED NOT MORE THAN 2 FEET ABOVE ACOUSTICAL CEILINGS.

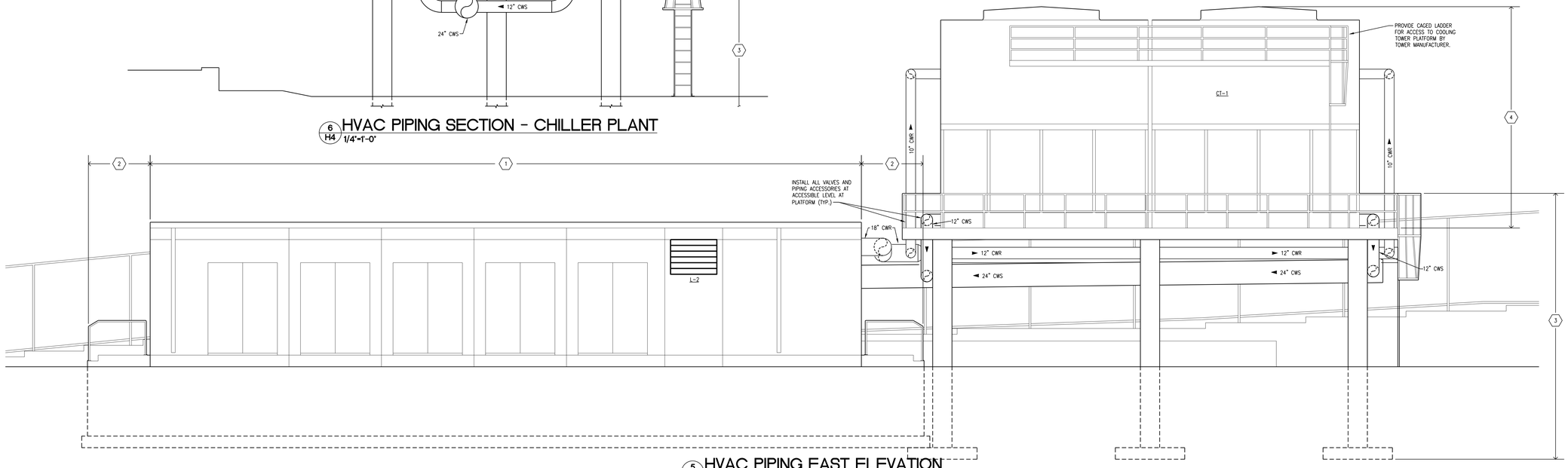
E. SHUT-OFF VALVES FOR ALL TERMINAL DEVICES SHALL BE AS ACCESSIBLE AS POSSIBLE TO THE CONTROLLED DEVICE.

F. PROVIDE 1" DRAIN VALVE AT ALL LOW POINTS OF EACH SYSTEM TO ENABLE COMPLETE DRAINAGE. PROVIDE 1/2" VENT VALVES AT ALL HIGH POINTS OF EACH SYSTEM TO ENABLE COMPLETE VENTING.

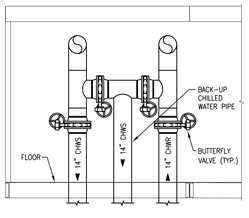
1. MODULAR CHILLER PLANT EQUIPMENT ENCLOSURE PROVIDED BY MANUFACTURER. SEE STRUCTURAL FOR CONCRETE FOUNDATION.
2. EQUIPMENT ENCLOSURE ACCESS LANDING, STEPS, AND RAILING BY CHILLER PLANT MANUFACTURER. CONFORM TO NFPA 101 LATEST EDITION. SEE STRUCTURAL FOR CONCRETE SLAB AND FOUNDATION.
3. COOLING TOWER SUPPORT STRUCTURE TO INCLUDE 20" DIA. CONCRETE PIER, FOUNDATION, STEEL BEAMS, LOWER SERVICE PLATFORM WITH RAILINGS, AND ACCESS LADDER. SEE STRUCTURAL.
4. COOLING TOWER UPPER, SERVICE PLATFORM WITH RAILINGS, AND ACCESS LADDER PROVIDED BY MANUFACTURER ON EAST AND WEST SIDES OF COOLING TOWER. LOCATE VALVES AND PIPING DEVICES AT ACCESSIBLE LOCATIONS ABOVE THE COOLING TOWER PLATFORM.



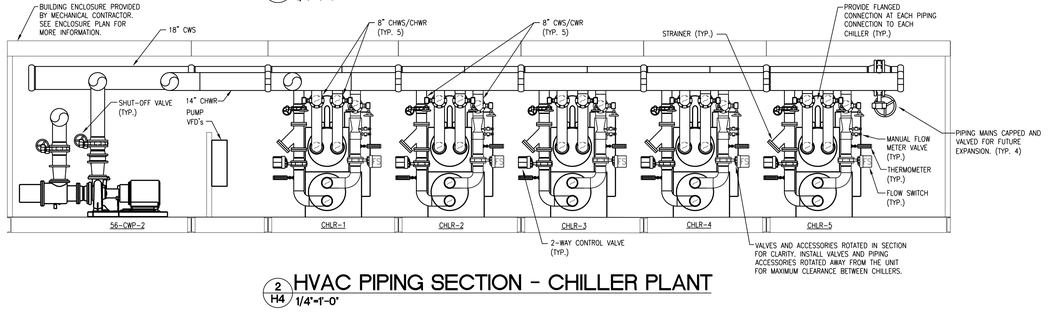
6 H4 HVAC PIPING SECTION - CHILLER PLANT
1/4"=1'-0"



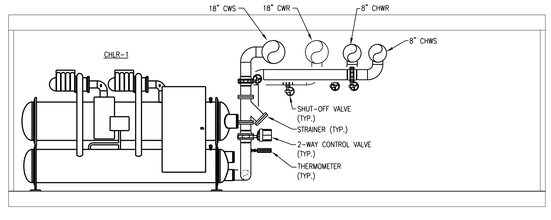
5 H4 HVAC PIPING EAST ELEVATION
1/4"=1'-0"



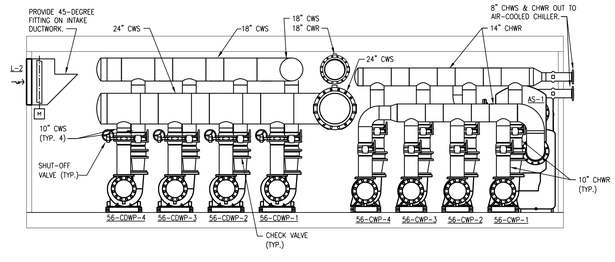
4 H4 HVAC PIPING SECTION - CHILLER PLANT
1/4"=1'-0"



2 H4 HVAC PIPING SECTION - CHILLER PLANT
1/4"=1'-0"



3 H4 HVAC PIPING SECTION - CHILLER PLANT
1/4"=1'-0"



1 H4 HVAC PIPING SECTION - CHILLER PLANT
1/4"=1'-0"

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MBN ENGINEERING, Civil & Electrical Engineers
SOLIEN & LARSON ENGINEERING, Structural Engineers

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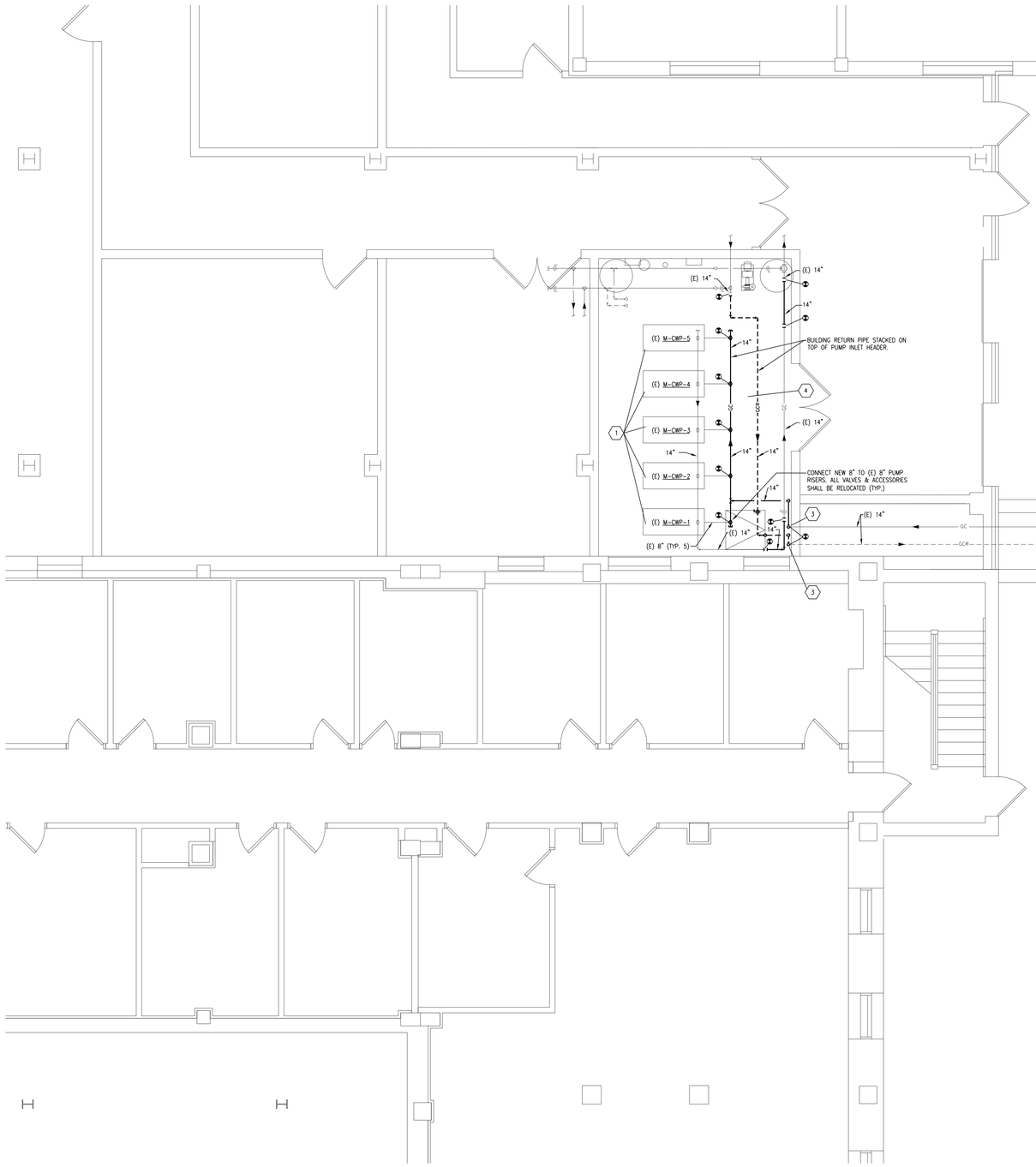
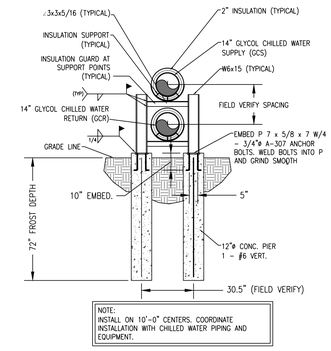
JOEL C. PECK PE - 6847 DATE 12/18/2015 REGISTERED PROFESSIONAL ENGINEER NORTH DAKOTA

Drawing Title	HVAC PIPING SECTIONS AND ELEVATION
Project Title	REPLACE CENTRAL CHILLER PLANT
Date	DECEMBER 18, 2015
Scale	AS SHOWN
VA Project No.	437-14-111
Contract No.	VA263-P-1217 VA263-C-
Designed By	JCP
Checked By	JCP
Drawn By	JAF
Drawing No.	H4
Building No.	56
AutoCAD File Name	2013282-16-H4.dwg
Location	FARGO VA HEALTH CARE SYSTEM FARGO, ND
Dwg. 15 of 26	

Department of Veterans Affairs

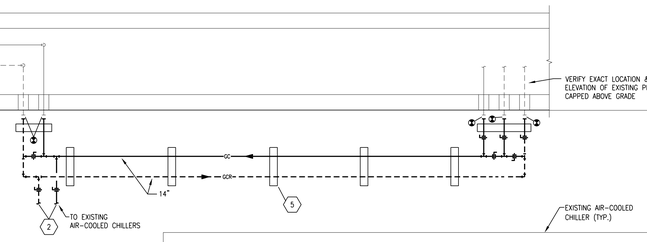


1 H5 HVAC PIPING PLAN - HOSPITAL
1/4"=1'-0"



NOTE:
INSTALL ON 10'-0" CENTERS. COORDINATE INSTALLATION WITH CHILLED WATER PIPING AND EQUIPMENT.

2 H5 PIPE SUPPORT FOR EXTERIOR, ABOVE GROUND PIPING DETAIL
NO SCALE



PHASING NOTES:

1. PRIOR TO DEMOLITION OF THE EXISTING CHILLERS AND THEIR ASSOCIATED PIPING, THE NEW CHILLER PLANT CONSTRUCTION SHALL BE COMPLETED AND TESTED ALONG WITH ALL TRAINING ON THE NEW EQUIPMENT. CAREFULLY COORDINATE ALL EXISTING CHILLER SHUTDOWNS AND PIPING CONNECTIONS TO EXISTING SYSTEM A MINIMUM OF 1 MONTH IN ADVANCE WITH THE OWNER. ANY SHUTDOWNS SHALL OCCUR DURING THE HEATING SEASON.
2. ALL WORK REQUIRED IN THE EXISTING CHILLER PUMP ROOM SHALL BE COMPLETED DURING THE HEATING SEASON AND NOT UNTIL THE NEW CHILLER PLANT IS READY TO BE PUT INTO OPERATION.
3. ANY REQUIRED DRAINING AND FILLING OF THE EXISTING SYSTEM SHALL BE COMPLETED ONLY DURING THE HEATING SEASON. SYSTEM SWITCHOVER TO THE NEW CHILLER PLANT SHALL BE DURING THE HEATING AFTER THE NEW PLANT IS OPERATIONAL AND OWNER TRAINING IS COMPLETE. THERE SHALL BE NO LOSS OF CHILLED WATER DURING THE COOLING SEASON.
4. SEE SHEET H1 FOR PHASING NOTES AND PLANS.

HVAC PIPING NOTES:

A. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK AND NOTIFY THE ARCHITECT/ ENGINEER OF ANY DISCREPANCIES BETWEEN THE "AS-BUILT" CONDITIONS AND THESE DRAWINGS.

B. COORDINATE ALL HVAC PIPING INSTALLATION WITH GENERAL, PLUMBING, FIRE PROTECTION, VENTILATION, AND ELECTRICAL CONTRACTORS. INSTALL ALL HVAC PIPING AS HIGH AS POSSIBLE. PROVIDE ALL NECESSARY OFFSETS (DROPS AND RISES) TO KEEP HVAC PIPING TIGHT TO THE STRUCTURE OR DUCTWORK ABOVE. OFFSET HVAC PIPING TO AVOID BEAMS AND INSTALLATION BY ALL TRADES.

C. THIS CONTRACTOR SHALL OPEN ALL EXISTING WALLS TO INSTALL NEW HVAC PIPING, EQUIPMENT, ETC. AS REQUIRED. PATCH WALLS AND/OR CEILINGS TO MATCH EXISTING.

D. MAINTAIN 3'-0" CLEAR SPACE IN FRONT OF ALL ELECTRICAL CONTROL, AND ACCESS PANELS FOR ACCESSIBILITY.

E. SHUT-OFF VALVES FOR ALL DEVICES SHALL BE AS ACCESSIBLE AS POSSIBLE TO THE CONTROLLED DEVICE.

F. PROVIDE 2" DRAIN VALVE AT ALL LOW POINTS OF EACH SYSTEM TO ENABLE COMPLETE DRAINAGE. PROVIDE 1/2" VENT VALVES AT ALL HIGH POINTS OF EACH SYSTEM TO ENABLE COMPLETE VENTING.

E. PRIOR TO DEMOLITION OF THE EXISTING CHILLERS AND THEIR ASSOCIATED PIPING, THE NEW CHILLER PLANT CONSTRUCTION SHALL BE COMPLETED AND TESTED ALONG WITH ALL TRAINING ON THE NEW EQUIPMENT. CAREFULLY COORDINATE ALL EXISTING CHILLER SHUTDOWNS AND PIPING CONNECTIONS TO EXISTING SYSTEM A MINIMUM OF 1 MONTH IN ADVANCE WITH THE OWNER.

F. ALL WORK REQUIRED IN THE EXISTING CHILLER PUMP ROOM SHALL BE COMPLETED DURING THE HEATING SEASON AND BE READY FOR OPERATION WITH THE NEW CHILLER PLANT.

1. UPDATE THE CONTROLS SEQUENCE ON THE EXISTING CHILLED WATER PUMPS THAT ARE CONTROLLED BY THE EXISTING SIEMENS CONTROL SYSTEM. THE EXISTING PUMPS SHALL RAMP UP AND DOWN AS REQUIRED TO MAINTAIN THE SYSTEM DIFFERENTIAL PRESSURE. WHEN ONE PUMP REACHES 80% CAPACITY, THE NEXT PUMP SHALL BE ACTIVATED AS IT CURRENTLY IS CONTROLLED IN A LEAD/LAG FASHION.
2. PROVIDE NEW CHILLED WATER PIPING WITH VALVES FOR TEMPORARY CONNECTION OF EXISTING CHILLERS UNDER PHASE 1. PROVIDE CHILLED WATER PIPING TO CONNECT THE NEW LINES TO THE EXISTING CHILLER MAIN PIPING. ONLY A SMALL PORTION OF THE EXTERIOR MAINS SHALL BE REMOVED IN PHASE 1 SO THAT NEW LINES CAN BE CONNECTED. CONNECT EXISTING CHILLER MAINS TO THE NEW LINES SO THAT THE INTERIOR PUMPS ARE PUMPING WATER FLOW INTO THE CHILLERS. THE NEUTRAL LEG SHALL BE CLOSED WHEN THE EXISTING CHILLER PLANT IS OPERATING. THE EXISTING CHILLERS SHALL REMAIN AVAILABLE FOR USE DURING THE TESTING AND COMMISSIONING PHASE OF THE NEW CHILLER PLANT. WHEN FINAL REMOVAL OF THE EXISTING AIR-COOLED CHILLERS BEGINS, THE OLD CHILLER PLANT LINES SHALL BE REMOVED AND CAPPED BACK AT THE NEW MAINS ON THE NORTH END OF THE EXISTING CHILLER AREA.
3. RELOCATE EXISTING THERMOMETERS, SENSORS, AND GAUGES ON EXISTING VERTICAL PIPING AS REQUIRED FOR NEW PIPING WORK.
4. ELECTRICAL CONTRACTOR TO PROVIDE COMMUNICATIONS CABLING TO NEW CHILLER PLANT. COORDINATE CONTROL PANEL LOCATION AND REQUIREMENTS WITH ELECTRICAL CONTRACTOR.
5. PIPE STACKED ON STANDS. SEE DETAILS ON H5 FOR PIPING SUPPORTS. PROVIDE @ EVERY CHANGE OF DIRECTION AND A MINIMUM OF ONE EVERY 10 FEET. COORDINATE FOUNDATIONS FOR PIPE SUPPORTS TO AVOID EXISTING RAMP FOUNDATION AND EXISTING UNDERGROUND POWER FEED FOR EXISTING HAZMAT BUILDING 53 THAT WILL BE ENCOUNTERED IN THIS AREA.

Revisions	Date

Dept. of Veterans Affairs
Health Care System
2101 Elm Street North
Fargo, ND 58102

IMAGE GROUP INC.
403 CENTER AVENUE, SUITE 300
MOORHEAD, MN 56560

Fargo ▪ Grand Forks ▪ Bismarck
Alexandria ▪ Minneapolis ▪ 877.380.0501

IMAGE GROUP INC., Architecture & Interiors
OBERMILLER NELSON ENGINEERING, Mechanical Engineers
MBN ENGINEERING, Civil & Electrical Engineers
SOLIEN & LARSON ENGINEERING, Structural Engineers

REGISTERED PROFESSIONAL ENGINEER
JOEL C. PECK
PE - 6847
DATE 12/18/2015
NORTH DAKOTA

Drawing Title: HVAC PIPING PLAN - HOSPITAL		Project Title: REPLACE CENTRAL CHILLER PLANT			Date: DECEMBER 18, 2015	
					Scale: AS SHOWN	
VA Project No.: 437-14-111	Contract No.: VA263-P-1217 VA263-C-	Designed By: JCP	Checked By: JCP	Drawn By: JAF	Drawing No.: H5	
Building No.: 56	AutoCAD File Name: 2013282-17-H5.dwg	Location: FARGO VA HEALTH CARE SYSTEM FARGO, ND			Dwg. 16 of 26	

Department of Veterans Affairs

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HVAC PIPING NOTES:

A. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK AND NOTIFY THE ARCHITECT/ ENGINEER OF ANY DISCREPANCIES BETWEEN THE "AS-BUILT" CONDITIONS AND THESE DRAWINGS.

B. COORDINATE ALL HVAC PIPING INSTALLATION WITH GENERAL, PLUMBING, FIRE PROTECTION, VENTILATION, AND ELECTRICAL CONTRACTORS. INSTALL ALL HVAC PIPING AS HIGH AS POSSIBLE. PROVIDE ALL NECESSARY OFFSETS (DROPS AND RISES) TO KEEP HVAC PIPING TIGHT TO THE STRUCTURE OR DUCTWORK ABOVE. OFFSET HVAC PIPING TO AVOID BEAMS AND INSTALATION BY ALL TRADES.

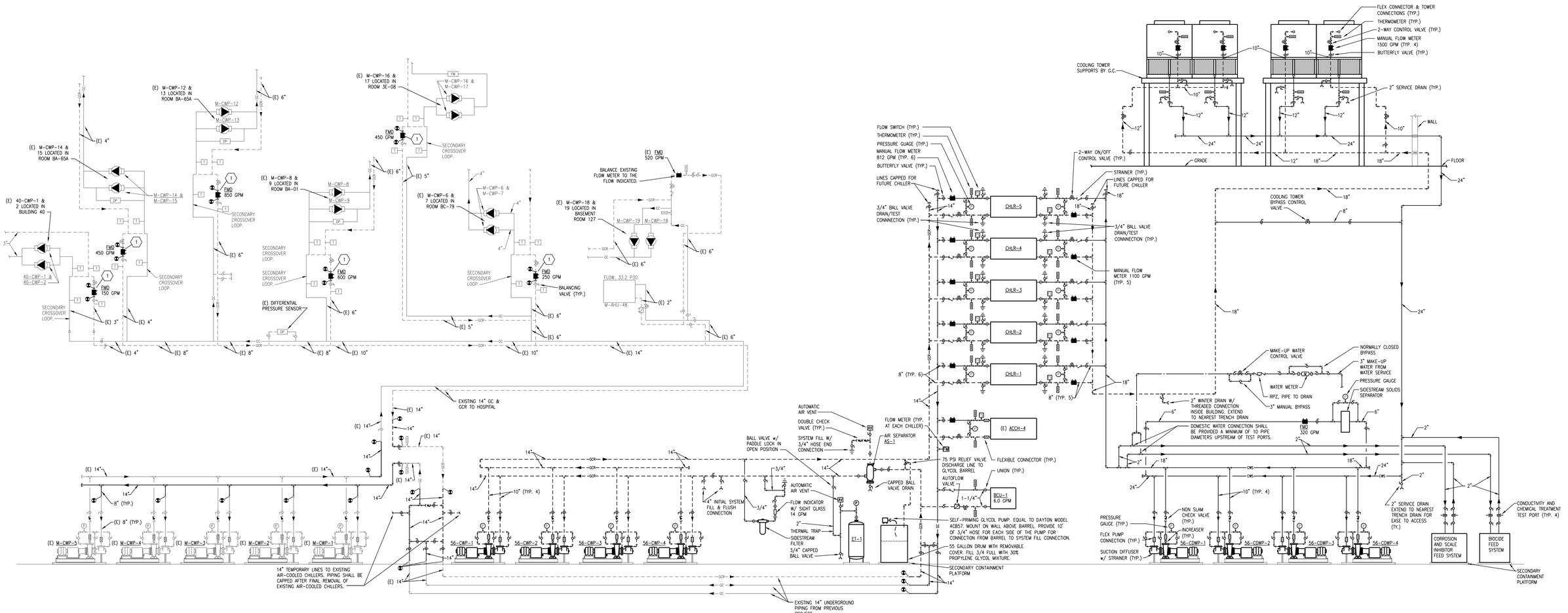
C. MAINTAIN 3'-0" CLEAR SPACE IN FRONT OF ALL ELECTRICAL, CONTROL, AND ACCESS PANELS FOR ACCESSIBILITY.

D. ALL SHUT-OFF VALVES, CONTROL VALVES, STRAINERS, ETC... SHALL BE INSTALLED IN ACCESSIBLE CEILINGS. VALVES SHALL BE LOCATED NOT MORE THAN 2 FEET ABOVE ACOUSTICAL CEILINGS.

E. SHUT-OFF VALVES FOR ALL DEVICES SHALL BE AS ACCESSIBLE AS POSSIBLE TO THE CONTROLLED DEVICE.

F. PROVIDE 2" DRAIN VALVE AT ALL LOW POINTS OF EACH SYSTEM TO ENABLE COMPLETE DRAINAGE. PROVIDE 1/2" VENT VALVES AT ALL HIGH POINTS OF EACH SYSTEM TO ENABLE COMPLETE VENTING.

(1) PROVIDE NEW MANUAL FLOW METER DEVICE IN EXISTING SECONDARY CROSSOVER LOOP FOR BALANCING PURPOSES TO REPLACE EXISTING AUTOFLOW VALVE. REVISE EXISTING PIPING AS REQUIRED TO INSTALL FLOW METER DEVICE. THE ROOM NUMBER WHERE DEVICE IS LOCATED IS LABELED ON PLAN.



(1) HVAC PIPING SCHEMATIC
H6 NTS

Revisions	Date

Dept. of Veterans Affairs
Health Care System
2101 Elm Street North
Fargo, ND 58102

IMAGE GROUP INC.
403 CENTER AVENUE, SUITE 300
MOORHEAD, MN 56560

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Fargo ▪ Grand Forks ▪ Bismarck
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IMAGE GROUP INC., Architecture & Interiors
OBERMILLER NELSON ENGINEERING, Mechanical Engineers
MBN ENGINEERING, Civil & Electrical Engineers
SOLIEN & LARSON ENGINEERING, Structural Engineers

REGISTERED PROFESSIONAL ENGINEER
JOEL D. PECK
PE - 6847
DATE 12/18/2015
NORTH DAKOTA

Drawing Title	HVAC PIPING SCHEMATIC
Project Title	REPLACE CENTRAL CHILLER PLANT
Date	DECEMBER 18, 2015
Scale	AS SHOWN
VA Project No.	437-14-111
Contract No.	VA263-P-1217 VA263-C-
Designed By	JCP
Checked By	JCP
Drawn By	JAF
Building No.	56
AutoCAD File Name	2013282-18-H6.dwg
Location	FARGO VA HEALTH CARE SYSTEM FARGO, ND
Drawing No.	H6
Dwg. 17 of 26	

Department of Veterans Affairs

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VENTILATION NOTES:

A. CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO BEGINNING WORK AND NOTIFY THE ARCHITECT/ ENGINEER OF ANY DISCREPANCIES BETWEEN THE "AS-BUILT" CONDITIONS AND THESE DRAWINGS.

B. COORDINATE ALL DUCTWORK INSTALLATION WITH GENERAL, PLUMBING, FIRE PROTECTION, AND ELECTRICAL CONTRACTORS. INSTALL ALL DUCTWORK AS HIGH AS POSSIBLE. PROVIDE ALL NECESSARY OFFSETS (DROPS AND RISES) TO KEEP DUCTWORK TIGHT TO THE STRUCTURE ABOVE AND INSTALLATION BY ALL TRADES. OFFSET DUCTWORK TO AVOID BEAMS.

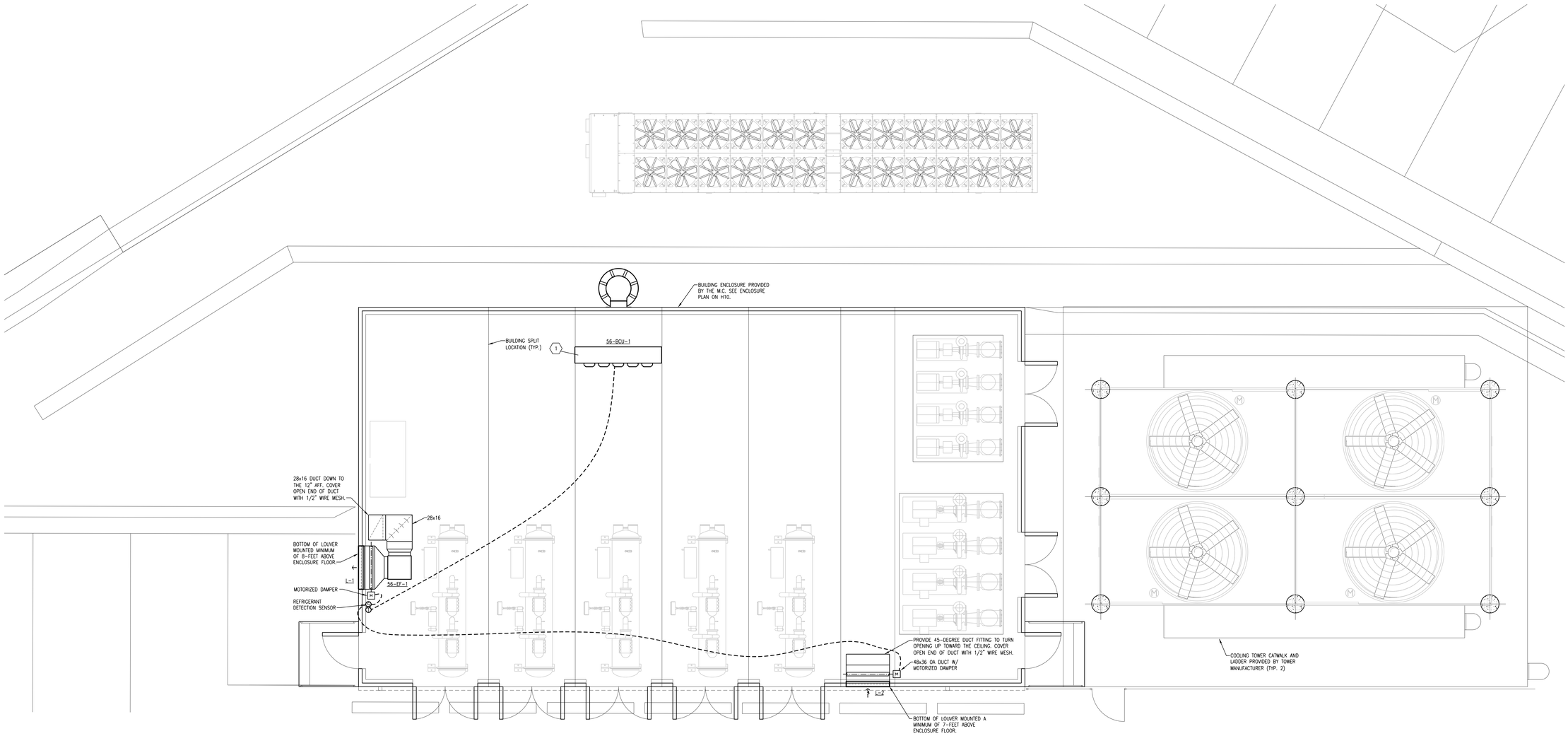
C. MAINTAIN 3'-0" CLEAR SPACE IN FRONT OF ALL ELECTRICAL CONTROL, AND ACCESS PANELS FOR ACCESSIBILITY.

D. ALL DAMPERS, ETC... SHALL BE INSTALLED IN ACCESSIBLE CEILINGS.

E. ALL OPEN ENDS OF DUCTS SHALL BE CAPPED AT THE END OF CONSTRUCTION EACH DAY.

F. ALL VAV BOXES, TERMINAL COILS, ETC.. SHALL BE LOCATED AS ACCESSIBLE AS POSSIBLE TO THE CONTROLLED DEVICE

(1) ROUTE 1" CONDENSATE FROM UNIT TO NEAREST DRAIN.



(1/H7) VENTILATION PLAN - CHILLER PLANT
1/4"=1'-0"

Revisions	Date

Dept. of Veterans Affairs
Health Care System
2101 Elm Street North
Fargo, ND 58102

IMAGE GROUP INC.
403 CENTER AVENUE, SUITE 300
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Fargo ▪ Grand Forks ▪ Bismarck
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SOLIEN & LARSON ENGINEERING, Structural Engineers

PROFESSIONAL ENGINEER
JOEL D. PECK
PE - 6847
DATE 12/18/2015
NORTH DAKOTA

Drawing Title: VENTILATION PLAN - CHILLER PLANT		Project Title: REPLACE CENTRAL CHILLER PLANT	Date: DECEMBER 18, 2015
			Scale: AS SHOWN
VA Project No.: 437-14-111	Contract No.: VA263-P-1217 / VA263-C-	Designed By: JCP / Checked By: JCP / Drawn By: JAF	Drawing No.: H7
Building No.: 56	AutoCAD File Name: 2013282-19-H7.dwg	Location: FARGO VA HEALTH CARE SYSTEM FARGO, ND	Dwg. 18 of 26

Department of Veterans Affairs

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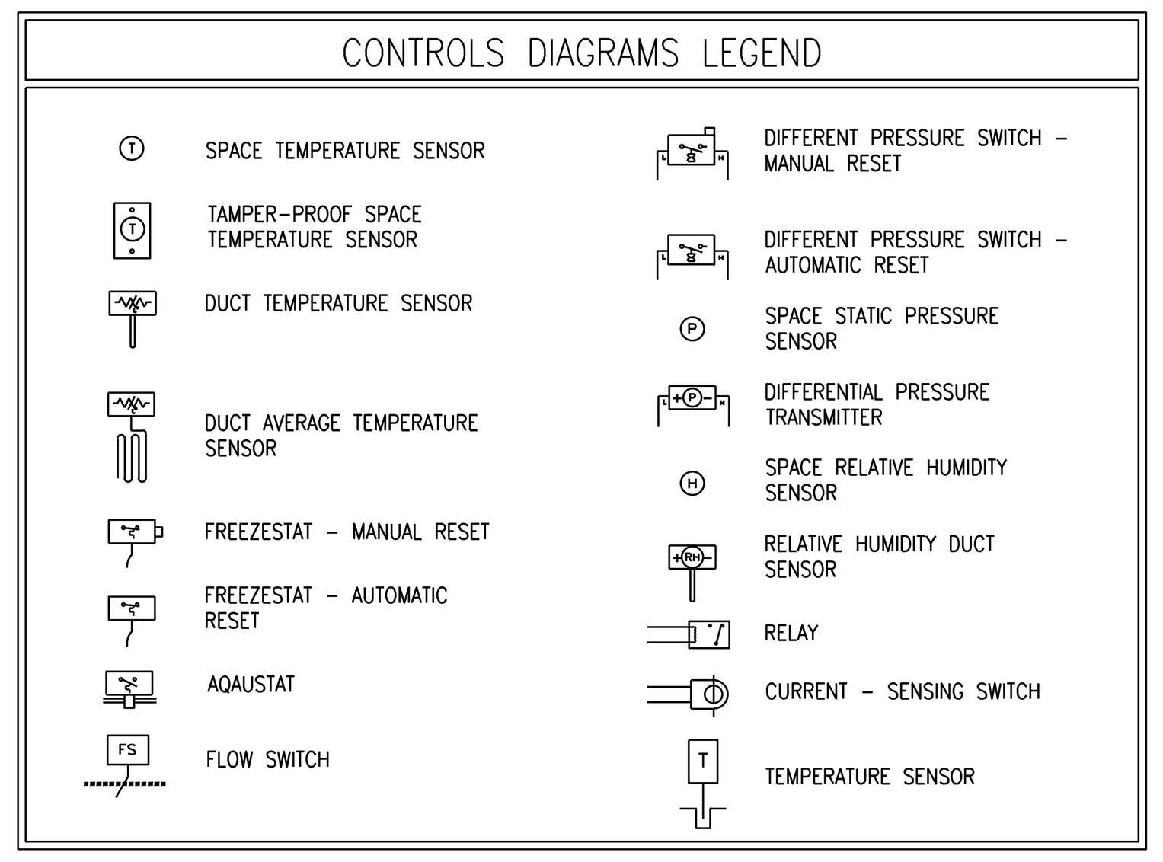
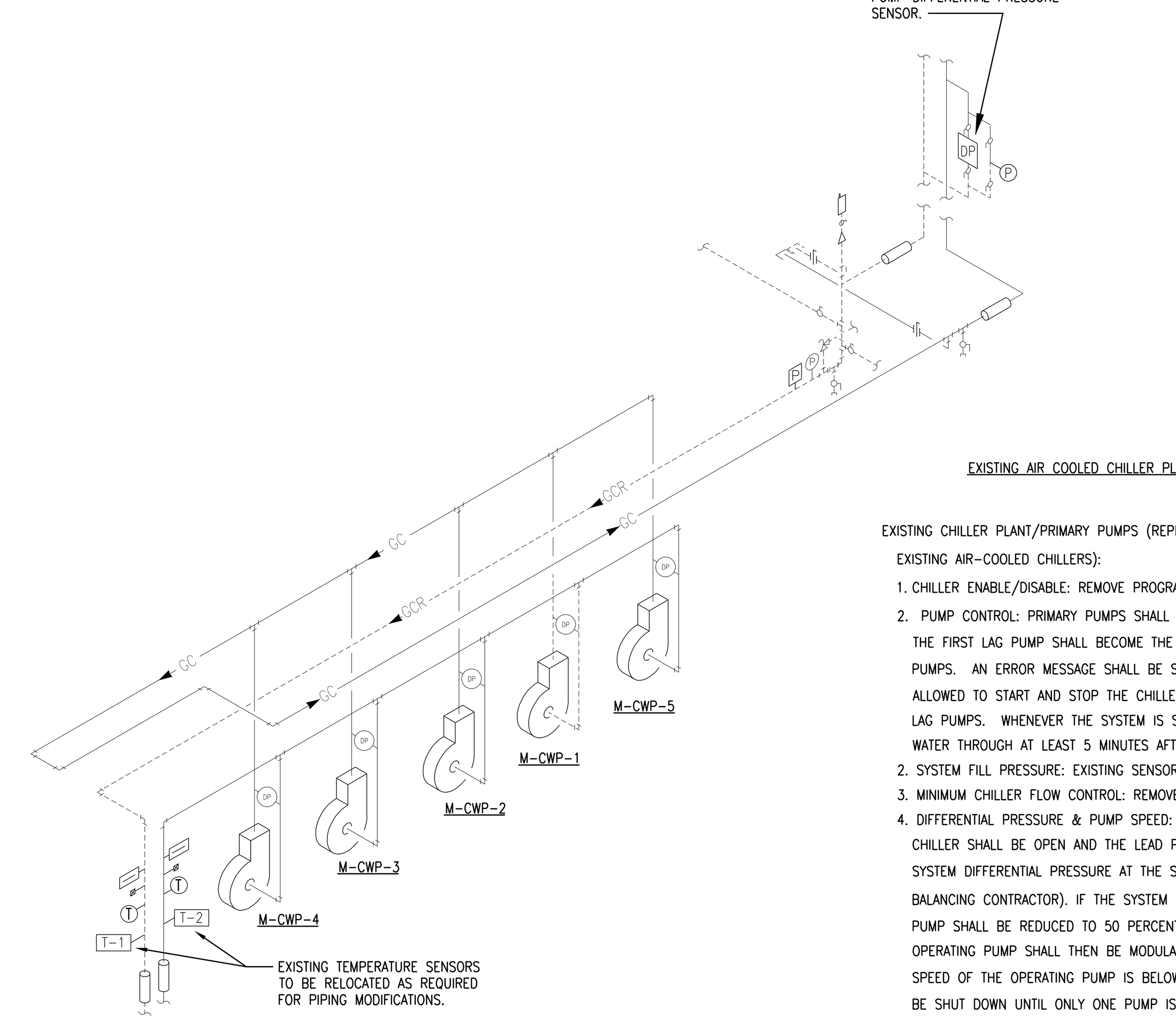
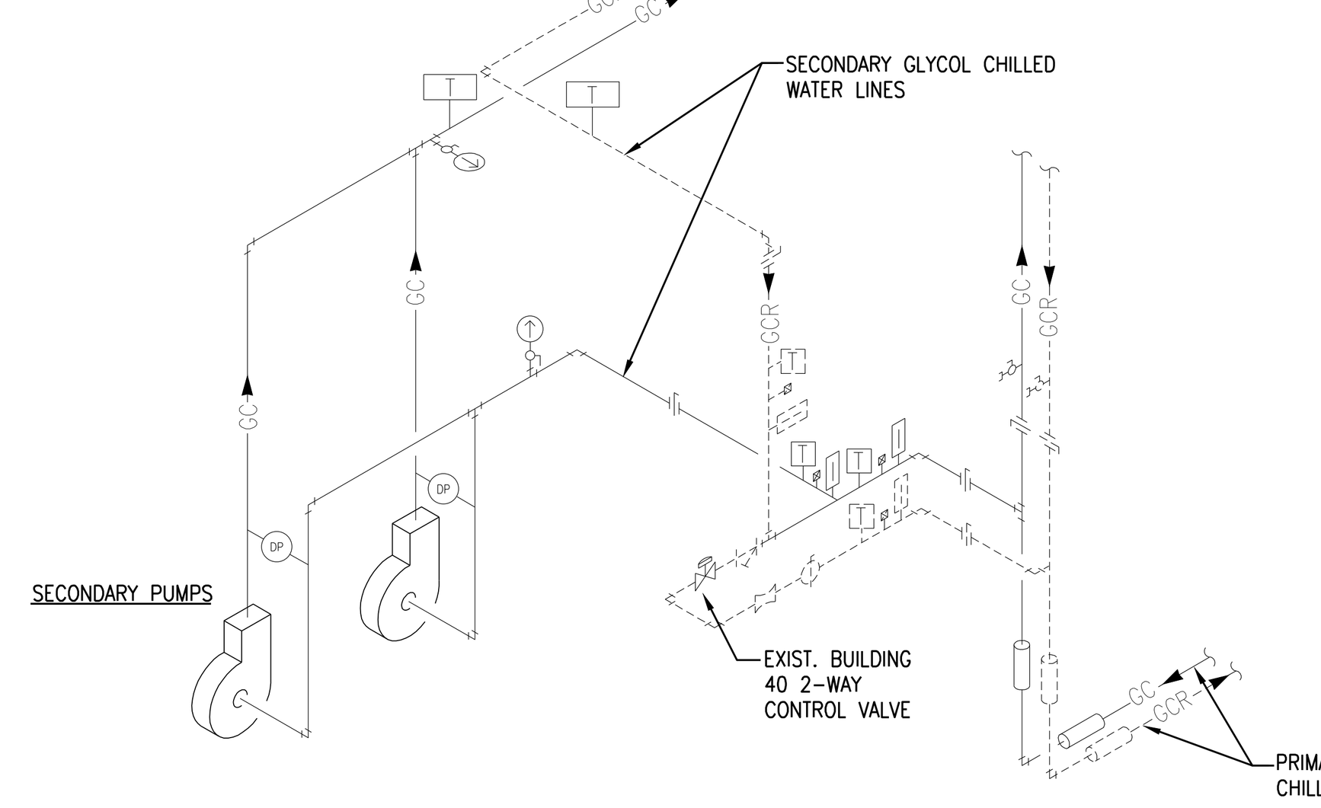




EXISTING AIR COOLED CHILLER PLANT SEQUENCE OF OPERATION

EXISTING CHILLER PLANT/PRIMARY PUMPS (REPROGRAMMING OF EXISTING SIEMENS CONTROLS FOR REMOVAL OF EXISTING AIR-COOLED CHILLERS):

1. CHILLER ENABLE/DISABLE: REMOVE PROGRAMMING FOR THIS FUNCTION.
2. PUMP CONTROL: PRIMARY PUMPS SHALL OPERATE IN A LEAD/LAG/LAG FASHION. IF THE LEAD PUMP FAILS, THE FIRST LAG PUMP SHALL BECOME THE LEAD PUMP AND THE REMAINING PUMPS SHALL BECOME LAG PUMPS. AN ERROR MESSAGE SHALL BE SENT TO THE OPERATOR'S WORKSTATION. THE OPERATOR SHALL BE ALLOWED TO START AND STOP THE CHILLER PLANT AND ASSIGN THE PRIORITY ORDER FOR THE LEAD AND LAG PUMPS. WHENEVER THE SYSTEM IS SHUT DOWN, THE LEAD PUMP SHALL CONTINUE TO CIRCULATE WATER THROUGH AT LEAST 5 MINUTES AFTER SHUTTING DOWN THE CHILLED WATER SYSTEM.
2. SYSTEM FILL PRESSURE: EXISTING SENSOR TO REMAIN.
3. MINIMUM CHILLER FLOW CONTROL: REMOVE PROGRAMMING FOR THIS FUNCTION.
4. DIFFERENTIAL PRESSURE & PUMP SPEED: ON SYSTEM STARTUP, THE CONTROL VALVE FOR THE LEAD CHILLER SHALL BE OPEN AND THE LEAD PRIMARY PUMP SHALL BE STARTED AND MODULATE TO MAINTAIN SYSTEM DIFFERENTIAL PRESSURE AT THE SETPOINT (SETPOINT COORDINATED WITH THE TESTING AND BALANCING CONTRACTOR). IF THE SYSTEM PRESSURE CANNOT BE MAINTAINED, THE SPEED OF THE LEAD PUMP SHALL BE REDUCED TO 50 PERCENT AND THE LAG PUMPS SHALL BE STARTED. THE SPEED OF EACH OPERATING PUMP SHALL THEN BE MODULATED TOGETHER TO SATISFY THE SYSTEM SETPOINT. WHEN THE SPEED OF THE OPERATING PUMP IS BELOW 25 PERCENT (ADJUSTABLE), LAG PUMPS SHALL CONTINUE TO BE SHUT DOWN UNTIL ONLY ONE PUMP IS RUNNING. IF ONLY ONE PUMP IS OPERATING AND THE SYSTEM DIFFERENTIAL PRESSURE RISES 10 PSI ABOVE THE SETPOINT (ADJUSTABLE), THE 2-WAY CONTROL VALVE IN BUILDING 40 SHALL MODULATE OPEN AS REQUIRED TO MAINTAIN THE SYSTEM PRESSURE.
5. CHILLER CONTROL: REMOVE PROGRAMMING FOR CONTROL OF EXISTING AIR-COOLED CHILLERS.
6. TEMPERATURE MONITORING: THE EXISTING CHILLED WATER SUPPLY AND RETURN TEMPERATURE SENSORS SHALL REMAIN IN OPERATION.



CHILLER POINT SCHEDULE										
CONTROL DEVICE	POINT NAME	POINT DESCRIPTION	POINT TYPE				ALARM			TOTALIZE
			AI	BI	AO	BO	HI	LOW	BIN	
T-1 (EXIST.)	PlantCWRTemp	PLANT CHILLED WATER RETURN TEMPERATURE	X							
T-2 (EXIST.)	PlantCWSTemp	PLANT CHILLED WATER SUPPLY TEMPERATURE	X				X		X	

3 / H8 EXISTING AIR COOLED CHILLER PLANT CONTROL DIAGRAM

NO SCALE

SEQUENCE OF OPERATION:

CHILLER CONTROL: REFER TO THE CHILLED WATER PLANT CONTROL SEQUENCE FOR CYCLING OF THE CHILLED WATER SYSTEM ON/OFF AND CAPACITY CONTROL.

CONDENSER WATER PUMP CONTROL: THE CONDENSER WATER PUMP SHALL RUN ANYTIME THE CHILLER IS CALLED TO RUN. THE CONDENSER PUMP DP CONTROL POINT WILL BE VARIED BY THE SYSTEM CONTROLLER TO ENSURE PROPER OPERATION OF THE CHILLER. IF THE SYSTEM CONTROLLER FAILS, THE SYSTEM WILL CONTROL TO 100% MOTOR SPEED. ADDITIONAL PUMPS SHALL BE STARTED AS NEEDED TO MAINTAIN SYSTEM LOOP PRESSURE AND DESIGN FLOW THROUGH ALL CHILLERS. IF THE PRIMARY PUMP IS AT 80% CAPACITY, THE SECOND PUMP SHALL BE ACTIVATED AND BOTH PUMPS SHALL RAMP UP AT THE SAME SPEED AS REQUIRED TO MAINTAIN THE DESIGN FLOW RATE. THE THIRD PUMP SHALL BE ACTIVATED IN THE SAME WAY. WHEN MULTIPLE PUMPS ARE OPERATING AND ARE EACH BELOW 35% (ADJUSTABLE) SPEED, ONE PUMP SHALL SHUT OFF AND THE REMAINING PUMP(S) SHALL OPERATE AT THE SAME SPEED TO MAINTAIN DESIGN FLOW RATE. THE CONDENSER WATER PUMP SHALL START PRIOR TO THE CHILLER BEING ENABLED AND SHALL STOP ONLY AFTER THE CHILLER IS DISABLED. THE CONDENSER WATER PUMP SHALL THEREFORE HAVE:

1. A USER ADJUSTABLE DELAY ON START AND A USER ADJUSTABLE DELAY ON STOP.
2. THE DELAY TIMES SHALL BE SET APPROPRIATELY TO ALLOW FOR ORDERLY CHILLED WATER SYSTEM START-UP, SHUTDOWN AND SEQUENCING.
3. ALARMS SHALL BE PROVIDED AS FOLLOWS:
   a. CONDENSER WATER PUMP FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
   b. CONDENSER WATER PUMP RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
   c. CONDENSER WATER PUMP RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.

IF A CONDENSER WATER PUMP IS COMMANDED TO OPERATE AND STATUS CANNOT BE PROVEN BY THE DIFFERENTIAL PRESSURE SENSOR ACROSS THE PUMP, A "CONDENSER WATER PUMP FAILURE" ALARM SHALL BE GENERATED. THE PUMP SPEED, AMPS, AND ALARM FROM THE VARIABLE FREQUENCY DRIVE SHALL BE MONITORED.

COOLING TOWER VFD FAN: CONDENSER WATER TEMPERATURE CONTROL – THE CONTROLLER SHALL MEASURE THE COOLING TOWER CONDENSER WATER SUPPLY (BASIN) TEMPERATURE AND MODULATE THE CONDENSER WATER BYPASS VALVE AND FAN VFD IN SEQUENCE TO MAINTAIN SETPOINTS.

1. THE FOLLOWING SETPOINTS ARE RECOMMENDED VALUES. ALL SETPOINTS SHALL BE FIELD ADJUSTED DURING THE COMMISSIONING PERIOD TO MEET THE REQUIREMENTS OF ACTUAL FIELD CONDITIONS.
2. THE SYSTEM WILL SELECT A CONDENSER WATER SUPPLY TEMPERATURE THAT PRODUCES THE LOWEST POWER USE OF THE CHILLER, COOLING TOWER AND CONDENSER WATER PUMP.
3. WHEN THE PRIMARY CHILLED WATER SYSTEM IS ENABLED (INDICATED BY A CONDENSER WATER PUMP BEING ON), THE LEAD COOLING TOWER ISOLATION VALVE OPENS AND THE COOLING TOWER CONTROL LOOP IS ENABLED. ADDITIONAL COOLING TOWER ISOLATION VALVES ARE STAGED OPEN BASED ON EITHER THE NUMBER OF CONDENSER WATER PUMPS IN OPERATION OR TO MAINTAIN CONDENSER WATER SUPPLY TEMPERATURE. AFTER ALL COOLING TOWER ISOLATION VALVES ARE OPEN, IF THE CONDENSER WATER SUPPLY TEMPERATURE INCREASES THE COOLING TOWER FANS ARE SEQUENCED ON AT MINIMUM SPEED. AFTER ALL COOLING TOWER FANS ARE ON AT MINIMUM SPEED, THE COOLING TOWER FAN VARIABLE FREQUENCY DRIVES ARE MODULATED IN UNISON TO MAINTAIN THE CONDENSER WATER SETPOINT OF 85 DEGREES F (29 DEGREES C). WHEN THE CONDENSER WATER SUPPLY TEMPERATURE DECREASES, THE COOLING TOWER FANS ARE FIRST MODULATED IN UNISON TO MINIMUM SPEED. COOLING TOWER FANS SHALL NOT BE ALLOWED TO OPERATE BELOW 20 HERTZ. WITH ALL COOLING TOWER FANS AT MINIMUM SPEED, A FURTHER DECREASE IN CONDENSER WATER SUPPLY TEMPERATURE CAUSES THE FANS TO BE CYCLED OFF.
4. ALARMS SHALL BE PROVIDED AS FOLLOWS:
   a. FAN FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
   b. RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
   c. RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
   d. VFD FAULT.
   e. HIGH COOLING TOWER SUPPLY TEMP: IF GREATER THAN 86°F (ADJ.).
   f. LOW COOLING TOWER SUPPLY TEMP: IF LESS THAN 38°F (ADJ.).
   g. HIGH APPROACH TEMP: IF GREATER THAN 10 DEGREES ABOVE DESIGN APPROACH TEMP (ADJUSTABLE).

CHILLER ISOLATION VALVES: CHILLED AND CONDENSER WATER VALVES AND VFDS SHALL BE CAPABLE OF MODULATING FLOWS IN ORDER TO CONTROL THE FLOW RATES THROUGH EACH CHILLER TO OPTIMAL VALUE, WHICH MAY BE BELOW CHILLER SUBMITTAL FLOW RATES (BUT NOT LESS THAN MFG REQUIRED MINIMUMS).

1. THE CONTROL SYSTEM WILL RECEIVE A SIGNAL FROM THE CHILLER VIA THE SERIAL GATEWAY TO CONTROL THE CONDENSER WATER INLET VALVE DURING SWITCH. IF THE SERIAL CONNECTION IS LOST, THE DIRECT CONNECTION OUTPUT FROM THE CHILLER TO THE CONTROL PANEL WILL BE USED AS THE BACKUP SIGNAL.
2. WHILE THE CONDENSER VALVE IS MODULATED TO MAINTAIN A PSI DIFFERENCE BETWEEN THE CHILLER REFRIGERANT PRESSURE AND THE CONDENSER REFRIGERANT PRESSURE. THE LOW FLOW CONDENSER WATER FLOW SWITCH WILL REMAIN IN OPERATION AT ALL TIMES, AND WILL BE INITIALLY SET AT 10% OF FULL FLOW (FINAL SETTING DETERMINED AT TIME OF STARTUP).

CONDENSER WATER TEMPERATURE CONTROL AND MONITORING: THE CONDENSER WATER TEMPERATURE ON THE OUTLET OF THE CONDENSER BARREL FOR EACH CHILLER SHALL BE MONITORED. THE MAIN PIPING CONDENSER WATER INLET AND OUTLETS AND SEPARATE CONDENSER WATER OUTLET OF THE COOLING TOWERS SHALL BE MONITORED. THE FLOW SHALL BE AVAILABLE AT EACH CHILLER BASED ON THE READINGS FROM THE DIFFERENTIAL PRESSURE SENSOR AT EACH CHILLER.

TEMPERATURE ALARMS: A LOW LIMIT ALARM SHALL BE SIGNALED BASED ON A CONDENSER WATER SUPPLY TEMPERATURE BELOW 48°F. A LOW LIMIT ALARM SHALL BE SIGNALED BASED ON A CONDENSER WATER RETURN TEMPERATURE BELOW 52°F. A HIGH LIMIT ALARM SHALL BE SIGNALED BASED ON A CONDENSER WATER SUPPLY TEMPERATURE ABOVE 90°F. A HIGH LIMIT ALARM SHALL BE SIGNALED BASED ON A CONDENSER WATER RETURN TEMPERATURE ABOVE 100°F. ALL TEMPERATURES SHALL BE ADJUSTABLE AND SET-UP BASED ON CHILLER MANUFACTURER RECOMMENDATIONS.

VIBRATION SWITCH MONITORING: THE VIBRATION SWITCH PROVIDED WITH EACH COOLING TOWER SHALL BE MONITORED. THE VIBRATION ALARM SWITCH SHALL BE MONITORED BY THE BAS AND SIGNAL WHEN AN ALARM CONDITION HAS OCCURRED.

DRAIN DOWN BYPASS VALVE CONTROL: THE DRAIN DOWN BYPASS VALVE SHALL BE CLOSED WHEN THE CHILLED WATER PUMP IS OPERATING. THE DRAIN DOWN BYPASS VALVE AND COOLING TOWER ISOLATION CONTROL VALVES SHALL BE OPEN WHEN DRAIN CYCLE ACTIVATED BY USER INPUT TO ENSURE THAT ALL CONDENSER WATER DRAINS FROM THE COOLING TOWER DURING FALL MAINTENANCE.

COOLING TOWER BYPASS CONTROL: DURING CHILLER PLANT START-UP, THE COOLING TOWER BYPASS CONTROL VALVE SHALL BE OPEN UNTIL THE CHILLER LEAVING CONDENSER WATER TEMPERATURE REACHES 65 DEGREES (ADJUSTABLE). THE VALVE SHALL BE NORMALLY CLOSED.

MINIMUM CONDENSER WATER FLOW RATE: COORDINATE WITH THE TEST & BALANCE CONTRACTOR, CHILLER (1100 GPM) MANUFACTURER FOR MINIMUM FLOW RATE REQUIREMENTS AND HAVE THAT AS THE SET MINIMUM REQUIREMENT WHEN COMMANDED TO OPERATE.

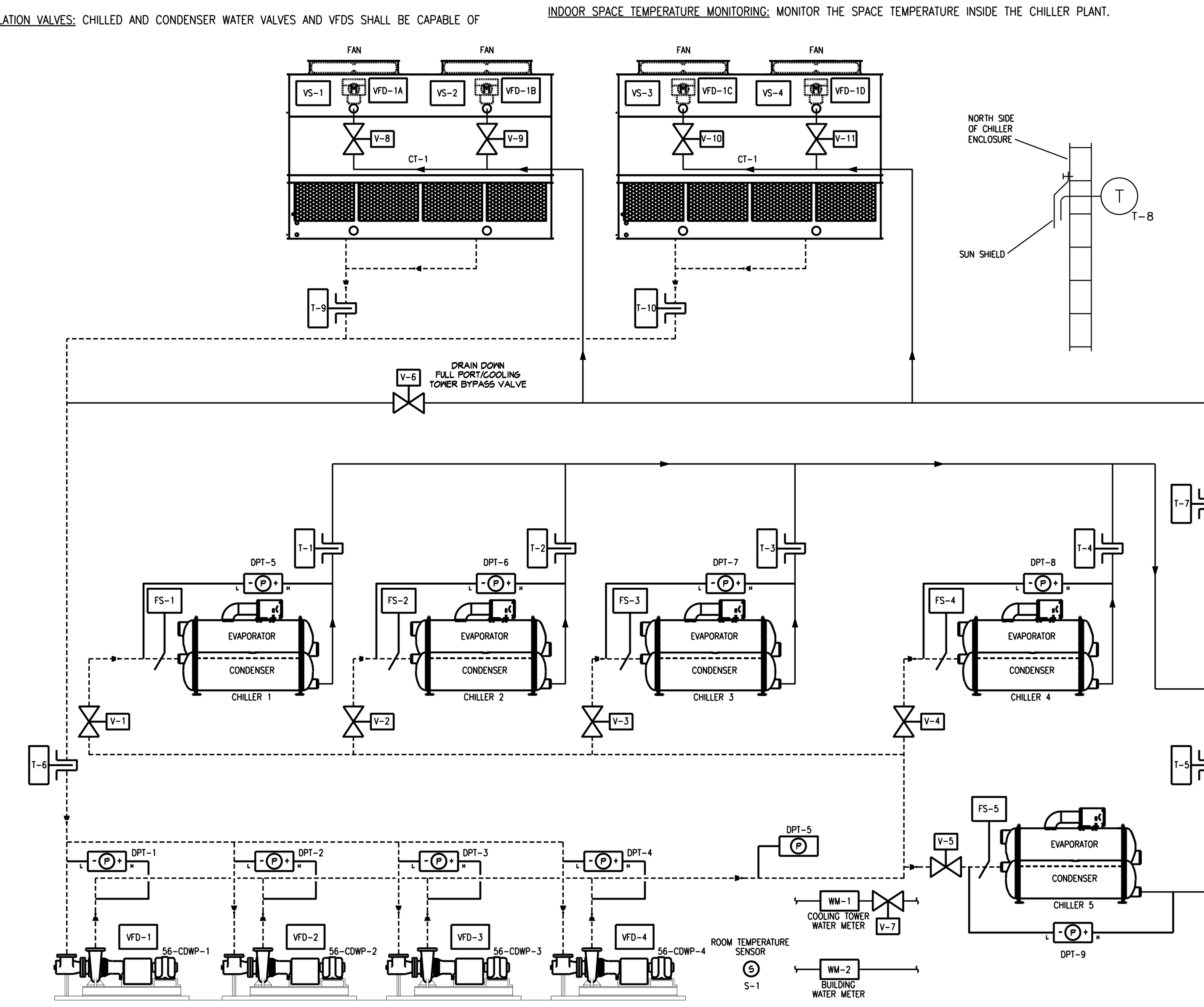
AUTOMATIC RESTART: ALL COOLING TOWERS, PUMPS, AND CHILLER PLANT EQUIPMENT SHALL RESTART AUTOMATICALLY IN CASE OF A LOSS OF POWER. ONLY TRANSMIT ERROR MESSAGES TO THE BUILDING AUTOMATION SYSTEM IF SYSTEMS FAIL TO RESTART.

MAKE-UP WATER CONTROL: THE LEVEL OF WATER IN THE COOLING TOWER SUMP SHALL BE MONITORED. THE VALVE SHALL BE ALLOWED TO MODULATE FROM 0 TO 100% OPEN BASED ON THE WATER LEVEL. AT THE MAXIMUM WATER LEVEL, THE MAKE-UP WATER VALVE SHALL BE CLOSED. AT THE MINIMUM WATER LEVEL, THE CONTROL VALVE SHALL BE OPEN 100%. THE VALVE SHALL BE SET TO MODULATE OPEN AS THE WATER LEVEL DROPS IN THE COOLING TOWER SUMP. THE WATER LEVEL SHALL BE AVERAGED BETWEEN THE 2 SENSORS LOCATED IN EACH BASIN.

WATER METER MONITORING: THE WATER METER SERVING THE COOLING TOWERS AND THE BUILDING WATER METER SHALL BE MONITORED TO RECORD MAKE-UP WATER SUPPLY TO THE COOLING TOWERS AND BUILDING USAGE, RESPECTIVELY. THE INSTANTANEOUS DAILY CONSUMPTION AND PEAK DAILY USAGE SHALL BE REPORTED.

OUTDOOR AIR WET BULB TEMPERATURE INPUT: THE OUTDOOR AIR WET BULB TEMPERATURE SHALL BE MONITORED.

INDOOR SPACE TEMPERATURE MONITORING: MONITOR THE SPACE TEMPERATURE INSIDE THE CHILLER PLANT.



POINT SCHEDULE										
CONTROL DEVICE	POINT NAME	POINT DESCRIPTION	POINT TYPE				ALARM			NOTES
			AI	BI	AO	BO	HI	LOW	BIN	
VFD-1A	VFD-1A	VFD-1A CONTROL, SPEED, AMPS, STATUS, ALARM	X	X	X	X	X		X	
VFD-1B	VFD-1B	VFD-1B CONTROL, SPEED, AMPS, STATUS, ALARM	X	X	X	X	X		X	
VFD-1C	VFD-1C	VFD-1C CONTROL, SPEED, AMPS, STATUS, ALARM	X	X	X	X	X		X	
VFD-1D	VFD-1D	VFD-1D CONTROL, SPEED, AMPS, STATUS, ALARM	X	X	X	X	X		X	
T-1	CHLR1LWT	CHILLER 1 CONDENSER LEAVING CHILLER TEMPERATURE	X							
T-2	CHLR2LWT	CHILLER 2 CONDENSER LEAVING CHILLER TEMPERATURE	X							
T-3	CHLR3LWT	CHILLER 3 CONDENSER LEAVING CHILLER TEMPERATURE	X							
T-4	CHLR4LWT	CHILLER 4 CONDENSER LEAVING CHILLER TEMPERATURE	X							
T-5	CHLR3EWT	CHILLER 5 CONDENSER LEAVING CHILLER TEMPERATURE	X							
T-6	CHLREWT	CHILLER CONDENSER ENTERING CHILLER TEMPERATURE	X				X	X		
T-7	CHLRLWT	CHILLER CONDENSER LEAVING CHILLER TEMPERATURE	X				X	X		
T-8	OAWBTemp	OUTDOOR AIR WET BULB TEMPERATURE	X							
T-9	CT1LWT	COOLING TOWER 1 LEAVING TEMPERATURE	X				X	X		
T-10	CT2LWT	COOLING TOWER 2 LEAVING TEMPERATURE	X				X	X		
V-1	CHLR1CTRLVLV	CHILLER 1 CONTROL VALVE			X					
V-2	CHLR2CTRLVLV	CHILLER 2 CONTROL VALVE			X					
V-3	CHLR3CTRLVLV	CHILLER 3 CONTROL VALVE			X					
V-4	CHLR4CTRLVLV	CHILLER 4 CONTROL VALVE			X					
V-5	CHLR5CTRLVLV	CHILLER 5 CONTROL VALVE			X					
V-6	CTDRNBYPVALVE	COOLING TOWER DRAIN DOWN/BYPASS VALVE			X					
V-7	MWVALVE	COOLING TOWER MAKE-UP VALVE			X					
V-8	CTSOVALVE1	COOLING TOWER SHUT-OFF VALVE 1			X					
V-9	CTSOVALVE2	COOLING TOWER SHUT-OFF VALVE 2			X					
V-10	CTSOVALVE3	COOLING TOWER SHUT-OFF VALVE 3			X					
V-11	CTSOVALVE4	COOLING TOWER SHUT-OFF VALVE 4			X					
VS-1	VIBSW1	VIBRATION SWITCH 1		X						
VS-2	VIBSW2	VIBRATION SWITCH 2		X						
VS-3	VIBSW3	VIBRATION SWITCH 3		X						
VS-4	VIBSW4	VIBRATION SWITCH 4		X						
DPT-1	PUMP1PRESDIFF	PUMP 1 PRESSURE DIFFERENTIAL	X						X	
DPT-2	PUMP2PRESDIFF	PUMP 2 PRESSURE DIFFERENTIAL	X						X	
DPT-3	PUMP3PRESDIFF	PUMP 3 PRESSURE DIFFERENTIAL	X						X	
DPT-4	PUMP4PRESDIFF	PUMP 4 PRESSURE DIFFERENTIAL	X						X	
DPT-5	PUMPLOOPPRES	PUMP LOOP PRESSURE	X							
DPT-6	CHLR1PRESDIFF	CHILLER 1 PRESSURE DIFFERENTIAL	X							
DPT-2	CHLR2PRESDIFF	CHILLER 2 PRESSURE DIFFERENTIAL	X							
DPT-3	CHLR3PRESDIFF	CHILLER 3 PRESSURE DIFFERENTIAL	X							
DPT-4	CHLR4PRESDIFF	CHILLER 4 PRESSURE DIFFERENTIAL	X							
DPT-5	CHLR5PRESDIFF	CHILLER 5 PRESSURE DIFFERENTIAL	X							
WM-1	MWWaterMeter	COOLING TOWER MAKE-UP WATER METER CONSUMPTION	X							
WM-2	BldgWaterMeter	BUILDING WATER METER CONSUMPTION	X							
FS-1	FLOWSWITCH1	CHILLER 1 FLOW SWITCH		X						
FS-2	FLOWSWITCH2	CHILLER 2 FLOW SWITCH		X						
FS-3	FLOWSWITCH3	CHILLER 3 FLOW SWITCH		X						
FS-4	FLOWSWITCH4	CHILLER 4 FLOW SWITCH		X						
FS-5	FLOWSWITCH5	CHILLER 5 FLOW SWITCH		X						
S-1	CHILLENCLTEMP	CHILLER ENCLOSURE ROOM TEMPERATURE	X							

2 / H8 COOLING TOWER PLANT CONTROL

NO SCALE

SEQUENCE OF OPERATION

SYSTEM GENERAL DESCRIPTION:

THE CHILLED WATER SYSTEM CONSISTS OF THE FOLLOWING:
FIVE (5) WATER COOLED CHILLERS.
ONE (1) AIR-COOLED CHILLER.
ONE (1) COOLING TOWER WHICH HAS FOUR (4) SEPARATE CELLS/FANS.
FOUR (4) DEDICATED CHILLER VARIABLE FLOW CONDENSER WATER PUMPS.
FOUR (4) DEDICATED COOLING TOWER VARIABLE FLOW CHILLED WATER PUMPS.

CHILLER – RUN CONDITIONS: THE CHILLER SHALL BE ENABLED TO RUN WHENEVER IT IS COMMANDED TO BE ENABLED BY THE CHILLER MANAGER PROGRAM. THE CHILLER SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS AND WITHIN PARAMETERS ESTABLISHED BY PUBLISHED FACTORY ENGINEERING DOCUMENTATION. THE BUILDING CHILLED WATER PUMPS AND COOLING TOWER PUMPS SHALL BE ACTIVATED AT THE SAME TIME AS THE CHILLER PUMPS. COORDINATE ACTIVATION OF EXISTING BUILDING CHILLED WATER PUMPS TO MATCH OPERATION OF THE NEW PLANT.

EMERGENCY SHUTDOWN: THE CHILLERS SHALL SHUT DOWN AND AN ALARM GENERATED UPON RECEIVING AN EMERGENCY SHUTDOWN SIGNAL STATUS.

REFRIGERANT DETECTION: THE CHILLERS SHALL SHUT DOWN AND AN ALARM GENERATED UPON RECEIVING A REFRIGERANT LEAK DETECTION STATUS.

CHILLED WATER ISOLATION VALVE: THE CHILLED WATER ISOLATION VALVES SHALL PROOF OPEN AND PROOF CLOSED. THE CHILLED WATER ISOLATION VALVE SHALL OPEN ANYTIME THE CHILLER IS CALLED TO RUN. THE CHILLED WATER ISOLATION VALVE SHALL OPEN PRIOR TO THE CHILLER BEING ENABLED AND SHALL CLOSE ONLY AFTER THE CHILLER IS DISABLED. THE CHILLED WATER ISOLATION VALVE SHALL HAVE A USER ADJUSTABLE DELAY ON START AND A USER ADJUSTABLE DELAY ON STOP. THE DELAY TIMES SHALL BE SET APPROPRIATELY TO ALLOW FOR ORDERLY CHILLED WATER SYSTEM START-UP, SHUTDOWN AND SEQUENCING. ALARMS SHALL BE PROVIDED AS FOLLOWS:

1. CHILLED WATER ISOLATION VALVE FAILURE: VALVE COMMANDED OPEN BUT THE STATUS INDICATES CLOSED.
2. CHILLED WATER ISOLATION VALVE OPEN IN HAND: VALVE COMMANDED CLOSED BUT THE STATUS INDICATES OPEN.

CHILLED WATER PUMP: THE CHILLED WATER PUMP SHALL RUN ANYTIME THE CHILLER IS CALLED TO RUN AND RUN A MINIMUM OF 5 MINUTES AFTER THE CHILLER IS DISABLED. THE CHILLED WATER PUMP DP SETTING WILL BE DETERMINED BY THE SYSTEM CONTROLLER IN RESPONSE TO CHANGES IN SYSTEM DEMAND. THE SYSTEM DIFFERENTIAL PRESSURE AND CHILLER VALVE POSITIONS SHALL BE MONITORED TO AID IN PUMP SPEED CONTROL. SHOULD THIS CONTROLLER FAIL, THE SYSTEM WILL CONTROL TO A CONSTANT DP SETTING AS DEFINED BY THE BALANCING CONTRACTOR. THE CHILLED WATER PUMP SHALL START PRIOR TO THE CHILLER BEING ENABLED AND SHALL STOP ONLY AFTER THE CHILLER IS DISABLED. THE CHILLED WATER PUMP SHALL THEREFORE HAVE:

1. A USER ADJUSTABLE DELAY ON START AND A USER ADJUSTABLE DELAY ON STOP.
2. THE DELAY TIMES SHALL BE SET APPROPRIATELY TO ALLOW FOR ORDERLY CHILLED WATER SYSTEM START-UP, SHUTDOWN AND SEQUENCING.
3. ALARMS SHALL BE PROVIDED AS FOLLOWS:
   a. CHILLED WATER PUMP FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
   b. CHILLED WATER PUMP RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
   c. CHILLED WATER PUMP RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
   d. CHILLED WATER PUMP VFD FAULT.

PUMPS ALTERNATE TO EQUALIZE RUNTIME. SELECTION OF THE LEAD, SECOND AND THIRD PUMP IS EVALUATED ON A WEEKLY BASIS. THE PUMP WITH THE LEAST RUNTIME IS THE LEAD PUMP. THE PUMP WITH THE MOST RUNTIME IS THE THIRD PUMP AND THE REMAINING PUMPS ARE STAGED BETWEEN THESE TWO IN A MANNER BASED ON TOTAL RUN TIME. IF THE LEAD PUMP IS AT 80% CAPACITY, THE SECOND PUMP SHALL BE ACTIVATED AND BOTH PUMPS SHALL RAMP UP AT THE SAME SPEED AS REQUIRED TO MAINTAIN THE DESIGN FLOW RATE. THE THIRD PUMP SHALL BE ACTIVATED IN THE SAME WAY. WHEN MULTIPLE PUMPS ARE OPERATING AND ARE EACH BELOW 35% (ADJUSTABLE) SPEED, ONE PUMP SHALL SHUT OFF AND THE REMAINING PUMP(S) SHALL OPERATE AT THE SAME SPEED TO MAINTAIN DESIGN FLOW RATE.

CHILLED WATER PUMP STATUS/FAILURE: THE BAS CONTROLLER SHALL DETECT CHILLED WATER PUMP RUN STATUS BY THE PUMP DIFFERENTIAL PRESSURE SWITCH. IF THE PUMP START/STOP RELAY IS ENABLED AND THE DIFFERENTIAL PRESSURE STATUS INDICATES THE PUMP IS OFF FOR MORE THAN 30 SECONDS (ADJ.), THE BAS CONTROLLER SHALL ANNUNCIATE A CHILLED WATER PUMP FAILURE ALARM TO THE BAS. ONCE THE PROBLEM HAS BEEN CORRECTED, THE OPERATOR SHALL BE ABLE TO CLEAR THE ALARM FAILURE FROM THE BAS CONTROLLER, FROM A BAS OR BY MANUALLY OVERRIDING THE PUMP ON MOMENTARILY.

CHILLER PLANT OPTIMAZATION (CPO) CONTROLLER: THE BUILDING AUTOMATION SYSTEM (BAS) SHALL EMPLOY A CENTRAL PLANT OPTIMIZATION SOFTWARE WITH INPUTS FROM EACH DEVICE IN THE SYSTEM AS LISTED ABOVE. THE OPTIMIZATION SOFTWARE SHALL PROVIDE INSIGHT TO THE CONTROLS SYSTEM TO SCHEDULE WHEN A DEVICE (I.E. CHILLER, COOLING TOWER FAN, PUMP, ETC.) SHOULD BE TURNED ON/OFF, RAMPED UP/DOWN, ETC. TO PROVIDE THE BEST OVERALL SYSTEM EFFICIENCY AVAILABLE WITH THE SYSTEM COMPONENTS IN PLACE. THE SYSTEM SHALL WORK TO SELECT THE MOST EFFICIENT AND EFFECTIVE COMBINATION OF CHILLERS, PUMPS AND COOLING TOWERS NEEDED TO MATCH THE BUILDING LOAD. IT SHALL COMMAND THE SELECTED DEVICES TO APPROPRIATE STATE AND SPEED, PROVIDING THE NECESSARY SEQUENCING OF PUMPS, ISOLATION VALVES AND MAIN EQUIPMENT WHILE OBSERVING ALL REQUIRED TIMING DELAYS FOR SAFE AND STABLE OPERATION OF THE CENTRAL CHILLER PLANT. THE SYSTEM SHALL CONTAIN STANDARDIZED ALGORITHMS CONFIGURED FOR CONTROL OF THE CENTRAL PLANT AS DESIGNED. IT SHALL BE CAPABLE OF BEING REPROGRAMMED AT ANY TIME TO ACCOMMODATE ADDITIONAL CHILLERS AND COOLING TOWERS IN ADDITION TO FUTURE CHANGES IN PLANT CONFIGURATION.

AS ACTUAL CHILLER LIFT (DIFFERENCE BETWEEN CONDENSER WATER TEMPERATURE AND LEAVING CHILLED WATER TEMPERATURE) VARIES FROM DESIGN LIFT, THE CPO SYSTEM APPLICATION SOFTWARE SHALL ADJUST THE RATED CAPACITIES IN THE CONTROL ALGORITHM TO THE RATED CAPACITIES NOTED IN THE PUBLISHED CHILLER MANUFACTURER PERFORMANCE CHARTS AND CURVES. THE SYSTEM SHALL INCREASE ACCURACY AND EFFICIENCY BY TAKING ADVANTAGE OF THE ADDED CAPACITY OF CHILLERS BEYOND THEIR RATINGS SPECIFICATIONS BY ACCOUNTING FOR THE SHIFTING OF OPTIMAL PERCENT LOAD POINTS IN VARIABLE SPEED CHILLERS.

CHILLER CONTROL: THE CHILLED WATER PLANT SHALL OPERATE TO MAINTAIN A DISCHARGE TEMPERATURE OF 44 DEGREES. ADDITIONAL CHILLERS AND COMPRESSORS SHALL BE ACTIVATED IN ORDER TO MAINTAIN DISCHARGE TEMPERATURE. AS EACH CHILLER IS ACTIVATED, THE 2-WAY CONTROL VALVE ASSOCIATED WITH THE CHILLER SHALL BE OPENED PRIOR TO OPERATING THE CHILLER. IF NOT ACTIVE, THE CHILLER CONTROL VALVE SHALL REMAIN CLOSED.

THE CHILLER SHALL BE ENABLED AFTER USER ADJUSTABLE TIME AFTER PUMP STATUSES ARE PROVEN ON. THE CHILLER SHALL THEREFORE HAVE A USER ADJUSTABLE DELAY ON START.

1. THE DELAY TIME SHALL BE SET APPROPRIATELY TO ALLOW FOR ORDERLY CHILLED WATER SYSTEM START-UP, SHUTDOWN AND SEQUENCING.
2. THE CHILLER SHALL RUN SUBJECT TO ITS OWN INTERNAL SAFETIES AND CONTROLS.
3. ALARMS SHALL BE PROVIDED AS FOLLOWS:
   a. CHILLER FAILURE: COMMANDED ON, BUT THE STATUS IS OFF.
   b. CHILLER RUNNING IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.
   c. CHILLER RUNTIME EXCEEDED: STATUS RUNTIME EXCEEDS A USER DEFINABLE LIMIT.
4. THE CHILLED WATER SUPPLY TEMPERATURE SETPOINT IS SET TO THE CHILLER PLANT DESIGN TEMPERATURE AND CAN BE MANUALLY ADJUSTED UPWARD BY THE OPERATOR.
5. THE CHILLED WATER SYSTEM ENABLE POINT IS CONTROLLED EITHER MANUALLY BY THE OPERATOR OR BY A PROGRAM FUNCTION (I.E. SCHEDULER). IF THE CHILLED WATER SYSTEM ENABLE POINT IS ON AND THERE IS A CALL FOR COOLING (INDICATED BY ONE OR MORE SELECTED COOLING COIL VALVES BEING OPEN MORE THAN 35%) AND THE OUTSIDE AIR TEMPERATURE IS ABOVE 55 DEGREES F (13 DEGREES C) THE LEAD CHILLER START SEQUENCE IS ACTIVATED.
6. THE CHILLER START SEQUENCE FIRST STARTS THE CONDENSER AND CHILLED WATER PUMPS. AFTER A TIME DELAY, THE CHILLER ISOLATION VALVES ARE OPENED. AFTER ANOTHER TIME DELAY, THE CHILLER START/STOP POINT TURNS ON. AFTER FLOW IS PROVEN, THE CHILLER OPERATES UNDER ITS OPERATING AND SAFETY CONTROLS.
7. AFTER ANY CHILLERS ARE COMMANDED, THE PROGRAM WAITS FOR 15 MINUTES BEFORE ISSUING ANY OTHER COMMANDS.
8. STAGING ON ADDITIONAL CHILLERS AND PUMPS IS BASED ON THE CHILLED WATER SUPPLY TEMPERATURE OR BY CHILLER PERCENT LOAD. IF THE CHILLED WATER SUPPLY TEMPERATURE IS ABOVE SET POINT (PLUS 2 DEGREES F (1 DEGREE C) – ADJUSTABLE) FOR MORE THAN 10 MINUTES, THEN THE NEXT CHILLER START SEQUENCE IS ACTIVATED.
9. STAGING OFF CHILLERS AND PUMPS IS BASED ON THE CHILLER PLANT DIFFERENTIAL TEMPERATURE (RETURN MINUS SUPPLY TEMPERATURE) OR BY PERCENT LOAD. A CHILLER STOP SEQUENCE IS ACTIVATED, WHENEVER THE CHILLER PLANT DIFFERENTIAL TEMPERATURE IS LESS THAN A PROPORTIONED DESIGN DIFFERENTIAL TEMPERATURE [(1-(1/# OF ONLINE CHILLERS)) X DESIGN DIFFERENTIAL TEMPERATURE] FOR MORE THAN 10 MINUTES. THE CHILLER STOP SEQUENCE FIRST STOPS THE CHILLER. AFTER A TIME DELAY, THE CHILLER ISOLATION VALVES ARE CLOSED. AFTER ANOTHER TIME DELAY, THE CONDENSER AND CHILLED WATER PUMPS ARE STOPPED.
10. THE CHILLED WATER SYSTEM CONTINUES TO OPERATE UNTIL EITHER THE CHILLED WATER SYSTEM ENABLE POINT IS OFF OR COOLING IS NO LONGER REQUIRED (INDICATED BY ALL AHUS BEING OFF OR ALL COOLING COIL VALVES BEING CLOSED FOR A 30 MINUTE TIME INTERVAL). WHEN THE CHILLED WATER SYSTEM SHUTS DOWN, ALL OPERATING CHILLERS AND PUMPS GO THROUGH A CHILLER STOP SEQUENCE.
11. THE DDC SYSTEM USES CURRENT SWITCHES TO CONFIRM THE PUMPS ARE IN THE DESIRED STATE (I.E. ON OR OFF) AND GENERATES AN ALARM IF STATUS DEVIATES FROM DDC START/STOP CONTROL. IF A PUMP GOES INTO ALARM THE NEXT PUMP IS STARTED.
12. IF A CHILLER GOES INTO ALARM THE NEXT CHILLER IS STARTED.
13. CHILLED WATER SUPPLY TEMPERATURE SHALL NOT BE RESET UP FROM DESIGN SETPOINT UNLESS SAFETY LIMITS ARE APPROACHED ON THE CHILLER. IN THIS CASE, THE TEMPERATURE MAY BE RESET UP TO AVOID THE SAFETY LIMITS. ALSO, CHILLED WATER SUPPLY TEMPERATURE MAY BE RESET UP IF THE SYSTEM IS MOVING IN AND OUT OF FREE COOLING.

DEMAND LIMITING CONTROL: PROVIDE PROGRAMMING THAT ENABLES THE OWNER TO AVOID UTILITY DEMAND CHARGES BY AUTOMATICALLY PREVENTING ADDITIONAL CHILLERS FROM STARTING WHEN THE COOLING LOAD INCREASES LATE IN THE DAY. THE LOAD DEMAND LIMIT AND TIME SHALL BE USER ADJUSTABLE.

REAL-TIME MONITORING: PROVIDE SOFTWARE THAT UTILIZES REAL-TIME MONITORING INFORMATION TO EVALUATE THE ACTUAL PERFORMANCE OF EACH CHILLER. THE SOFTWARE SHALL INCORPORATE THIS INFORMATION WITHIN THE OPTIMIZATION ALGORITHMS TO ENSURE OPTIMAL PLANT EFFICIENCY EVEN AS INDIVIDUAL CHILLER PERFORMANCE VARIES WITH AGE.

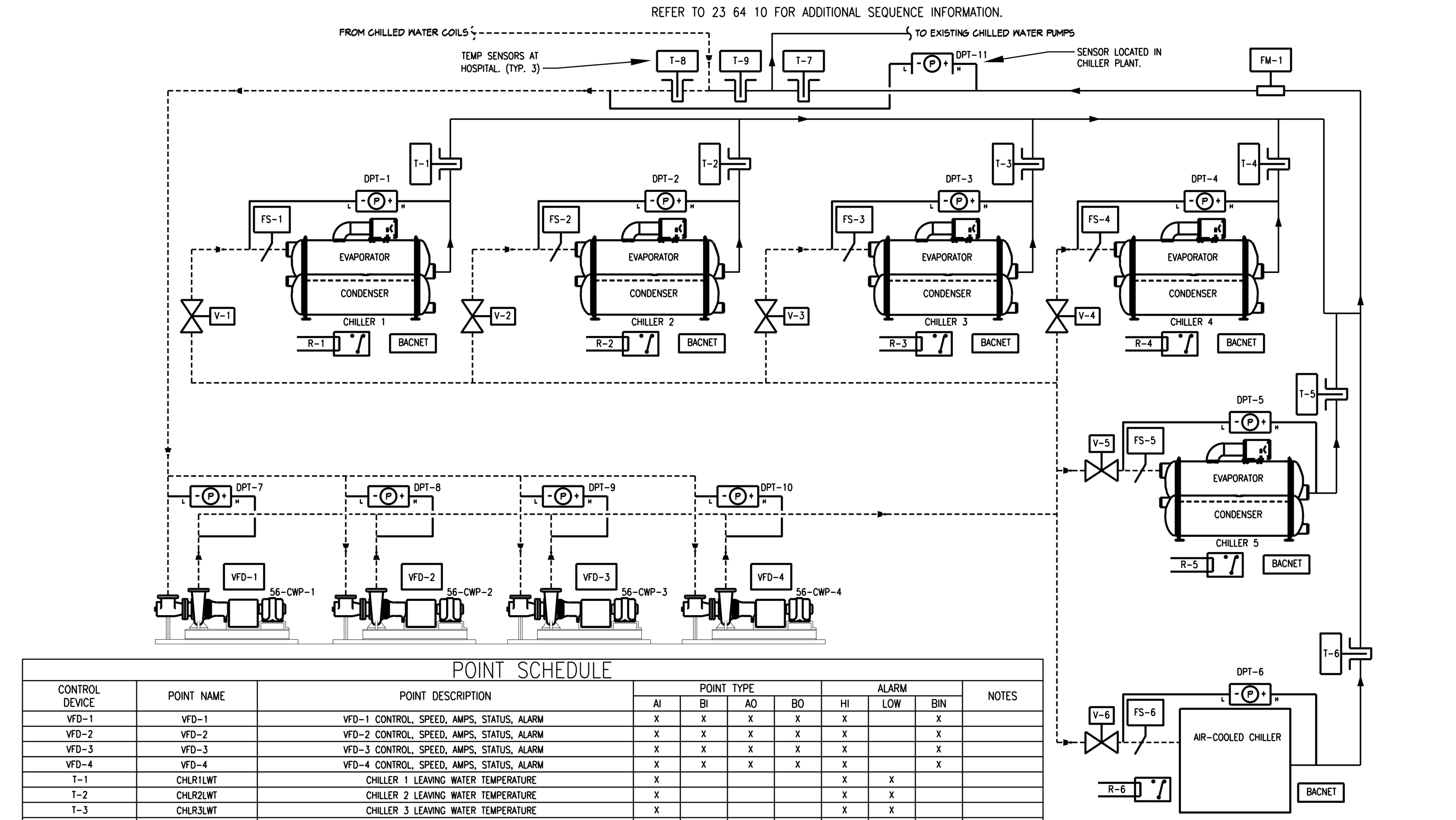
CHILLED WATER PUMP START/STOP: THE BAS CONTROLLER SHALL START A CHILLED WATER PUMP THROUGH A CONTACT CLOSURE OF THE PUMPS VARIABLE FREQUENCY DRIVE (VFD) RUN-ENABLE CONTACTS.

AUTOMATIC RESTART: ALL CHILLERS, PUMPS, AND CHILLER PLANT EQUIPMENT SHALL RESTART AUTOMATICALLY IN CASE OF A LOSS OF POWER. ONLY TRANSMIT ERROR MESSAGE TO THE BUILDING AUTOMATION SYSTEM IF SYSTEMS FAIL TO RESTART.

AIR-COOLED CHILLER: IF THE COOLING TOWERS ARE NOT ACTIVE AND THERE IS A CALL FOR COOLING, THE AIR-COOLED CHILLER SHALL BE ACTIVATED. THE AIR-COOLED CHILLER SHALL BE USED WHEN ACTIVATED FROM THE TEMPERATURE CONTROLS SYSTEM, THE CONDENSER SYSTEM IS NOT ACTIVE BUT THERE IS A CALL FOR COOLING, OR WHEN ALL THE WATER-COOLED CHILLERS ARE OPERATING AND AN INCREASE IN DEMAND IS NEEDED TO SATISFY THE DISCHARGE TEMPERATURE.

TEMPERATURE AND FLOW MONITORING: THE DISCHARGE TEMPERATURE FOR EACH CHILLER, THE MAIN CHILLER SUPPLY PIPING TEMPERATURE, MAIN RETURN CHILLED WATER TEMPERATURE, AND BYPASS PIPING WATER TEMPERATURE SHALL BE MONITORED. ALARMS SHALL BE GENERATED IF THE CHILLED WATER SUPPLY TEMPERATURE IS GREATER THAN 55 AND LESS THAN 38 DEGREES. THE FLOW SHALL BE AVAILABLE AT EACH CHILLER BASED ON THE READINGS FROM THE DIFFERENTIAL PRESSURE SENSOR AT EACH CHILLER.

REFER TO 23 64 10 FOR ADDITIONAL SEQUENCE INFORMATION.



POINT SCHEDULE										
CONTROL DEVICE	POINT NAME	POINT DESCRIPTION	POINT TYPE				ALARM			NOTES
			AI	BI	AO	BO	HI	LOW	BIN	
VFD-1	VFD-1	VFD-1 CONTROL, SPEED, AMPS, STATUS, ALARM	X	X	X	X	X		X	
VFD-2	VFD-2	VFD-2 CONTROL, SPEED, AMPS, STATUS, ALARM	X	X	X	X	X		X	
VFD-3	VFD-3	VFD-3 CONTROL, SPEED, AMPS, STATUS, ALARM	X	X	X	X	X		X	
VFD-4	VFD-4	VFD-4 CONTROL, SPEED, AMPS, STATUS, ALARM	X	X	X	X	X		X	
T-1	CHLR1LWT	CHILLER 1 LEAVING WATER TEMPERATURE	X				X	X		
T-2	CHLR2LWT	CHILLER 2 LEAVING WATER TEMPERATURE	X				X	X		
T-3	CHLR3LWT	CHILLER 3 LEAVING WATER TEMPERATURE	X				X	X		
T-4	CHLR4LWT	CHILLER 4 LEAVING WATER TEMPERATURE	X				X	X		
T-5	CHLR5LWT	CHILLER 5 LEAVING WATER TEMPERATURE	X				X	X		
T-6	CHLR6LWT	CHILLER 6 LEAVING WATER TEMPERATURE	X				X	X		
T-7	MAINCHLRLWT	MAIN CHILLED WATER SUPPLY TEMPERATURE	X				X	X		
T-8	CHLREWT	CHILLER ENTERING WATER TEMPERATURE	X				X	X		
T-9	CHLRBYPLWT	BYPASS LINE WATER TEMPERATURE	X				X	X		
DPT-1	CHLR1PRESDIFF	CHILLER 1 PRESSURE DIFFERENTIAL	X							
DPT-2	CHLR2PRESDIFF	CHILLER 2 PRESSURE DIFFERENTIAL	X							
DPT-3	CHLR3PRESDIFF	CHILLER 3 PRESSURE DIFFERENTIAL	X							
DPT-4	CHLR4PRESDIFF	CHILLER 4 PRESSURE DIFFERENTIAL	X							
DPT-5	CHLR5PRESDIFF	CHILLER 5 PRESSURE DIFFERENTIAL	X							
DPT-6	CHLR6PRESDIFF	CHILLER 6 PRESSURE DIFFERENTIAL	X							
DPT-7	PUMP1PRESDIFF	PUMP 1 PRESSURE DIFFERENTIAL	X						X	
DPT-8	PUMP2PRESDIFF	PUMP 2 PRESSURE DIFFERENTIAL	X						X	
DPT-9	PUMP3PRESDIFF	PUMP 3 PRESSURE DIFFERENTIAL	X						X	
DPT-10	PUMP4PRESDIFF	PUMP 4 PRESSURE DIFFERENTIAL	X						X	
DPT-11	SYSPRESDIFF	SYSTEM PRESSURE DIFFERENTIAL	X							
R-1	CHLR1CTRL	CHILLER 1 CONTROL				X				
R-2	CHLR2CTRL	CHILLER 2 CONTROL				X				
R-3	CHLR3CTRL	CHILLER 3 CONTROL				X				
R-4	CHLR4CTRL	CHILLER 4 CONTROL				X				
R-5	CHLR5CTRL	CHILLER 5 CONTROL				X				
R-6	CHLR6CTRL	CHILLER 6 CONTROL				X				
BACNET1	CHLR1BACNET	CHILLER 1 BACNET (MAP ALL AVAILABLE POINTS)	X	X	X	X	X	X	X	
BACNET2	CHLR2BACNET	CHILLER 2 BACNET (MAP ALL AVAILABLE POINTS)	X	X	X	X	X	X	X	
BACNET3	CHLR3BACNET	CHILLER 3 BACNET (MAP ALL AVAILABLE POINTS)	X	X	X	X	X	X	X	
BACNET4	CHLR4BACNET	CHILLER 4 BACNET (MAP ALL AVAILABLE POINTS)	X	X	X	X	X	X	X	
BACNET5	CHLR5BACNET	CHILLER 5 BACNET (MAP ALL AVAILABLE POINTS)	X	X	X	X	X	X	X	
BACNET6	CHLR6BACNET	CHILLER 6 BACNET (MAP ALL AVAILABLE POINTS)	X	X	X	X	X	X	X	
FS-1	FLOWSWITCH1	CHILLER 1 FLOW SWITCH		X						
FS-2	FLOWSWITCH2	CHILLER 2 FLOW SWITCH		X						
FS-3	FLOWSWITCH3	CHILLER 3 FLOW SWITCH		X						
FS-4	FLOWSWITCH4	CHILLER 4 FLOW SWITCH		X						
FS-5	FLOWSWITCH5	CHILLER 5 FLOW SWITCH		X						
FS-6	FLOWSWITCH6	CHILLER 6 FLOW SWITCH		X						
V-1	CHLR1CTRLVLV	CHILLER 1 CONTROL VALVE			X					
V-2	CHLR2CTRLVLV	CHILLER 2 CONTROL VALVE			X					
V-3	CHLR3CTRLVLV	CHILLER 3 CONTROL VALVE			X					
V-4	CHLR4CTRLVLV	CHILLER 4 CONTROL VALVE			X					
V-5	CHLR5CTRLVLV	CHILLER 5 CONTROL VALVE			X					
V-6	CHLR6CTRLVLV	CHILLER 6 CONTROL VALVE			X					
FM-1	SYSFLOWMET	SYSTEM FLOW METER	X							

1 / H8 CHILLED WATER PLANT CONTROL

NO SCALE

Revisions | Date

Dept. of Veterans Affairs
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MBN ENGINEERING, Civil & Electrical Engineers
SOLIEN & LARSON ENGINEERING, Structural Engineers

REGISTERED PROFESSIONAL ENGINEER JOEL C. PECK PE - 6847 NORTH DAKOTA

Drawing Title		Project Title			Date
MECHANICAL CONTROLS		REPLACE CENTRAL CHILLER PLANT			DECEMBER 18, 2015
VA Project No. 437-14-111	Contract No. VA263-P-1217 VA263-C-	Designed By JCP	Checked By JCP	Drawn By JAF	Scale AS SHOWN
Building No. 56	AutoCAD File Name 2013282-20-H8.dwg	Location FARGO VA HEALTH CARE SYSTEM FARGO, ND			Drawing No. H8
					Dwg. 19 of 26

Department of Veterans Affairs

LOUVER SCHEDULE

UNIT NO.	LOCATION	WIDTH	HEIGHT	FRAME	DEPTH	CFM	FREE AREA	PD	NOTES
L-1	CHILLER PLANT	48	24	ALUM	4"	3,600	50%	0.1	1
L-2	CHILLER PLANT	48	36	ALUM	4"	4,000	50%	0.1	1

PD PRESSURE DROP, IN.W.C.
ALUM ALUMINUM

NOTES:
1. PROVIDE 1/2" BIRDSCREEN ON INSIDE OF LOUVER.

COOLING TOWER SCHEDULE

UNIT NO.	LOCATION	SERVICE	NO. CELLS	FLOW RATE EACH CELL	CAPACITY (TONS)	EAT (°F WB)	EWT (°F)	LWT (°F)	INLET WPD	FAN MOTOR NO.	HP	PH	V	CFM	VFD	SUMP HEATER TYPE	kW	MAX OPER. WEIGHT	MAX HEIGHT	DISC BY	dBA	NOTES
CT-1	ROOF	COND. WATER	4	1500	2036	76	95	85	9'	4	40	3	460	126,125	Y	ELEC.	15 (4)	74100 LBS	17'-6"	EC	72	1

DISC DISCONNECT
MC MECHANICAL CONTRACTOR
EC ELECTRICAL CONTRACTOR

NOTES:
1. dBA SCHEDULED IS SOUND PRESSURE LEVEL BASED ON 50 FEET FROM UNIT AND 0=2.
2. PROVIDE ULTRA LOW SOUND FAN, VIBRATION SWITCH, FLUME PLATE, AND (2) WATER LEVEL SENSORS.

FAN SCHEDULE

UNIT NO.	LOCATION	CFM	S.P.	FAN TYPE	ARRANGEMENT, ROTATION, & DISCHARGE	WHEEL TYPE	WHEEL MIN. DIA.	MAX. RPM	DRIVE	MAX. BHP	MOTOR HP	MOTOR VOLT	MOTOR PH	VARIABLE CONTROL TYPE
56-EF-1	CHILLER PLANT	3600	0.6	IL	INLINE DIRECT DRIVE	ALUMINUM	17	1725	DIRECT	0.65	2	208	1	YES

NOTES:
1. SCHEDULED MAXIMUM BHP IS FOR SCHEDULED SP PLUS TEN PERCENT. FORWARD CURVED WHEEL MAY BE SUBMITTED IN LIEU OF AIR FOIL WHEEL FOR AIR HANDLING UNITS IF SCHEDULED MAXIMUM BHP IS MET. IF UNIT COIL PRESSURE DROPS SUBMITTED ARE LESS THAT SCHEDULED, THE SP REQUIREMENT MAY BE REDUCED ACCORDINGLY. MAXIMUM BHP MAY BE BASED ON THE REVISED SP PLUS TEN PERCENT.
2. 56-EF-1 SHALL BE PROVIDED WITH UNIT MOUNTED DISCONNECT, ISOLATOR HANGERS, INSULATED CABINET, SIDE DISCHARGE, AND SPEED CONTROL DIAL.

WATER COOLED CHILLER SCHEDULE

UNIT NO.	LOCATION	NOM. TONS	EVAPORATOR EWT (°F)	EVAPORATOR LWT (°F)	EVAPORATOR GPM	EVAPORATOR PD (FT)	CONDENSER EWT (°F)	CONDENSER LWT (°F)	CONDENSER GPM	CONDENSER PD (FT)	ELECTRIAL VOLTS	PH	MCA	LRA	MFS	FULL LOAD KW/TON	NPLV KW/TON	DISC BY	NOTES
CHLR-1	BUILDING 56	355.0	55.1	44.0	812.0	12.0	85.0	95.0	1100.0	12.0	460	3	200 (2)	476 (2)	350 (2)	0.679	0.364	MC	1,2,3
CHLR-2	BUILDING 56	355.0	55.1	44.0	812.0	12.0	85.0	95.0	1100.0	12.0	460	3	200 (2)	476 (2)	350 (2)	0.679	0.364	MC	1,2,3
CHLR-3	BUILDING 56	355.0	55.1	44.0	812.0	12.0	85.0	95.0	1100.0	12.0	460	3	200 (2)	476 (2)	350 (2)	0.679	0.364	MC	1,2,3
CHLR-4	BUILDING 56	355.0	55.1	44.0	812.0	12.0	85.0	95.0	1100.0	12.0	460	3	200 (2)	476 (2)	350 (2)	0.679	0.364	MC	1,2,3
CHLR-5	BUILDING 56	355.0	55.1	44.0	812.0	12.0	85.0	95.0	1100.0	12.0	460	3	200 (2)	476 (2)	350 (2)	0.679	0.364	MC	1,2,3

MCA MINIMUM CIRCUIT AMPACITY
PD PRESSURE DROP, FT. OF WATER
AMB AMBIENT TEMPERATURE (F)
EWT ENTERING WATER TEMPERATURE
LWT LEAVING WATER TEMPERATURE
DISC DISCONNECT
MC MECHANICAL CONTRACTOR
EC ELECTRICAL CONTRACTOR

NOTES:
1. PROVIDE DUAL POINT POWER CONNECTION FOR ISOLATION OF EACH COMPRESSOR CIRCUIT. ELECTRICAL DATA LISTED IN SCHEDULE IS FOR EACH POINT OF THE DUAL POINT CONNECTION.
2. CHILLER DESIGN BASED ON 30% PROPYLENE GLYCOL/WATER MIXTURE.
3. PROVIDE DISCONNECT SWITCH FOR EACH POWER CONNECTION.

EXPANSION TANK/AIR SEPARATOR SCHEDULE

UNIT NO	SYSTEM	APPROX. VOLUME GAL	SYSTEM TEMP. MIN	SYSTEM TEMP. MAX	INITIAL, PRESS. TANK (PSIG)	MAX. OPER. PRESS.	FILL PRESS. AT TANK RELIEF VALVE	FILL PRESS. AT TANK AT TANK	MIN. VOL. GAL.	MIN. ACPT VOL GAL	AIR SEPARATOR SIZE IN	AIR SEPARATOR GPM	AIR SEPARATOR MAX P.D. FT	AIR SEPARATOR BUILT-IN STRAINER	SIZE TO TANK IN.	WATER FILL SIZE
ET-1/AS-1	CHILLER	13992	40	90	12	125	75	26.5	422	422	14	4000	2	NO	2"	2"

CIRCULATING PUMP (HVAC) SCHEDULE

UNIT NO.	LOCATION	CIRCULATING FLUID SYSTEM	FLUID	GPM	HEAD (FT.)	TEMP	SP. GR.	% EFF.	TYPE	MOTOR HP	MOTOR VOLT	MOTOR PH
56-CWP-1	CHILLER PLANT	CH. WATER	PG30	1870	105	42	1.03	73.3	HES	75	460	3
56-CWP-2	CHILLER PLANT	CH. WATER	PG30	1870	105	42	1.03	73.3	HES	75	460	3
56-CWP-3	CHILLER PLANT	CH. WATER	PG30	1870	105	42	1.03	73.3	HES	75	460	3
56-CWP-4	CHILLER PLANT	CH. WATER	PG30	1870	105	42	1.03	73.3	HES	75	460	3
56-CDWP-1	CHILLER PLANT	CONDENSER	WATER	2400	80	90	1.00	78.4	HES	75	460	3
56-CDWP-2	CHILLER PLANT	CONDENSER	WATER	2400	80	90	1.00	78.4	HES	75	460	3
56-CDWP-3	CHILLER PLANT	CONDENSER	WATER	2400	80	90	1.00	78.4	HES	75	460	3
56-CDWP-4	CHILLER PLANT	CONDENSER	WATER	2400	80	90	1.00	78.4	HES	75	460	3

NOTES:
1. ALL PUMPS TO BE VFD DUTY (VFD's PROVIDED WITH EQUIPMENT) AND RATED FOR 1780 RPM.

WATER HEATER SCHEDULE

UNIT NO.	LOCATION	AREA SERVED	SYSTEM/ SERVICE	# ELEMENTS	EWT	LWT	REC. GPH	STOR GAL	ELECTRICAL KW	ELECTRICAL VOLTS	ELECTRICAL PH	DISC BY	NOTES
56-WH-1	CHILLER PLANT	BLDG. 56	DOM. HW	2	40	120	61	66	(2) 4.5	480	3	EC	1

NG NATURAL GAS
P PROPANE
E ELECTRIC
DISC DISCONNECT
MC MECHANICAL CONTRACTOR
EC ELECTRICAL CONTRACTOR

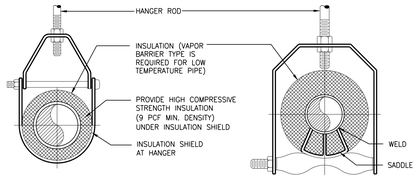
NOTES:
1. PROVIDE 2 ELEMENTS WITH SIMULTANEOUS WIRING.

BLOWER-COIL UNIT SCHEDULE

UNIT NO.	AREA SERVED	TYPE	CFM	ESP	MOTOR AMPS	MOTOR VOLT	MOTOR PH	DISC BY	HEATING COIL	COOLING COIL	MIN OA CFM	FILTER TYPE	NOTES
56-BCU-1	CHILLER PLANT	H/D	6,300	0.50	5	120	1	EC	N/A	NOTE 1	-	-	1,2,3

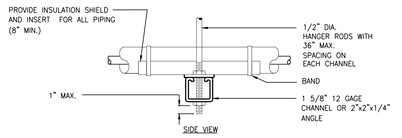
H HORIZONTAL
V VERTICAL
D DRAW THRU
B BLOW THRU
TA THROW-AWAY
DISC DISCONNECT
MC MECHANICAL CONTRACTOR
EC ELECTRICAL CONTRACTOR

NOTES:
1. COOLING COIL CAPACITY SHALL BE 78.3 MBH WITH 80/67 DEGREE ENTERING AND 56/55 LEAVING AIR TEMPERATURE, AIR PRESSURE DROP SHALL BE 0.7" AND WATER PRESSURE DROP SHALL BE 9-FEET. FLOW SHALL BE 6.0 GPM AT AN ENTERING WATER TEMPERATURE OF 44 DEGREES.
2. COOLING COIL SHALL BE SIZED FOR 30% PROPYLENE GLYCOL/WATER MIXTURE.
3. PROVIDE 3-FAN UNIT WITH ECM MOTORS.



ADJUSTABLE CLEVIS HANGER TYPE 1 – SEE SPECIFICATIONS

ADJUSTABLE CLEVIS HANGER TYPE 43 – SEE SPECIFICATIONS

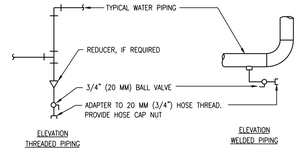


TRAPEZE HANGER FOR UP TO 1000 LB (453 KG) UNIFORM LOAD

MAXIMUM PIPE/TUBING SUPPORT SPACING, FEET																
NOM. SIZE	THRU 3/4"	1	1¼	1½	2	2½	3	4	5	6	8	10	12	14	16	18	20	24
PIPE	7 FT	7	7	9	10	11	12	14	16	17	19	22	23	25	27	28	30	32
TUBING	5 FT	6	7	8	8	9	10	12	13	14	16	–	–	–	–	–	–	–
NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.																		

DESIGNER'S NOTE:
SHOW ON THE DRAWINGS OTHER SPECIFIED AND SPECIAL AND SPECIAL PIPE SUPPORTS WHERE REQUIRED.

4 H9 TYPICAL PIPE HANGERS
NO SCALE

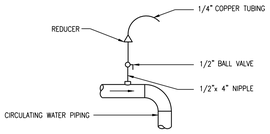


ELEVATION THREADED PIPING

ELEVATION WELDED PIPING

TYPICAL CHILLED AND HOT WATER PIPING DRAIN VALVE CONNECTIONS

NOTES:
1. DRAIN ALL LOW POINTS AS INDICATED ABOVE.
2. WHERE SCALE POCKETS ARE SHOWN ON PIPE RISER DIAGRAMS AND/OR PLANS LOCATE DRAIN AT BOTTOM OF SCALE POCKET.

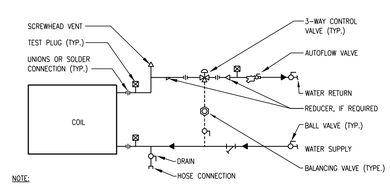


ELEVATION

TYPICAL AIR VENT

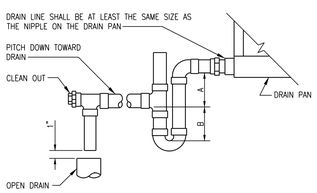
NOTES:
1. VENT ALL HIGH POINTS INDICATED ABOVE.
2. IF AUTOMATIC AIR VENTS ARE USED, PIPE DISCHARGE TO DRAIN

2 H9 TYPICAL CHILLED AND HEATING HOT WATER DRAIN VALVE CONNECTIONS AND AIR VENT DETAILS
NO SCALE



NOTE:
A STRAIGHT-THRU MODULATING CONTROL VALVE IS SHOWN BY SOLID PIPING. WHEN HEATING SCHEMATIC INDICATES THAT A THREE-WAY MODULATING CONTROL VALVE IS REQUIRED, PROVIDE DASHED PIPING AND FITTINGS ALSO.

3 H9 TYPICAL PIPING CONNECTIONS TO FAN COIL DETAIL
NO SCALE



DESIGNER'S NOTE:

UNIT TYPE	A	B
DRAW THRU	2"PLUS X	X
BLOW THRU	1"MINIMUM	2X

WHERE X = STATIC PRESSURE IN PAN

1 H9 FAN COIL UNIT DRAIN TRAP DETAIL
NO SCALE

Revisions	Date

Dept. of Veterans Affairs
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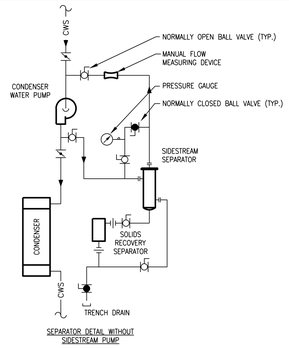
OBERMILLER NELSON ENGINEERING, Mechanical Engineers
MBN ENGINEERING, Civil & Electrical Engineers
SOLIEN & LARSON ENGINEERING, Structural Engineers

PROFESSIONAL ENGINEER – DEL D. PECK – PE - 6847 – DATE 12/18/2015 – NORTH DAKOTA

Drawing Title	MECHANICAL SCHEDULES AND DETAILS
Project Title	REPLACE CENTRAL CHILLER PLANT
Date	DECEMBER 18, 2015
Scale	AS SHOWN
VA Project No.	437-14-111
Contract No.	VA263-P-1217 VA263-C-
Designed By	JCP
Checked By	JCP
Drawn By	JAF
Drawing No.	H9
Building No.	56
AutoCAD File Name	2013282-21-H9.dwg
Location	FARGO VA HEALTH CARE SYSTEM FARGO, ND
	Dwg. 20 of 26

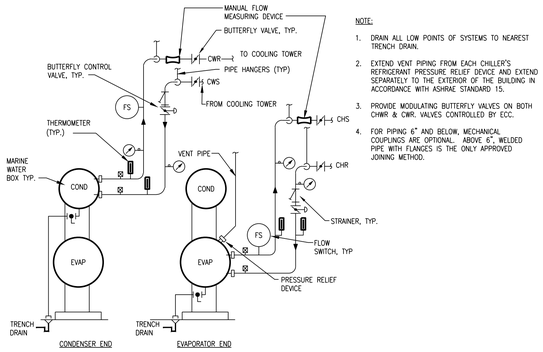
Department of Veterans Affairs

F:\Projects\2013282\DWG\2013282-21-H9.dwg Dec 17, 2015 - 7:47am



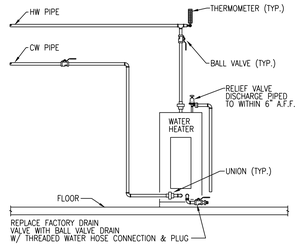
SEPARATOR DETAIL WITHOUT SIDESTREAM PUMP

20 H10 SIDESTREAM SOLIDS SEPARATOR
NO SCALE

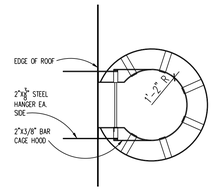


NOTE:
1. DRAIN ALL LOW POINTS OF SYSTEMS TO NEAREST TRENCH DRAIN.
2. EXTEND VENT PIPING FROM EACH CHILLER'S REFRIGERANT PRESSURE RELIEF DEVICE AND EXTEND SEPARATELY TO THE EXTERIOR OF THE BUILDING IN ACCORDANCE WITH ASHRAE STANDARD 15.
3. PROVIDE MODULATING BUTTERFLY VALVES ON BOTH CHWR & CWR. VALVES CONTROLLED BY ECC.
4. FOR PIPING 6" AND BELOW, MECHANICAL COUPLINGS ARE OPTIONAL. ABOVE 6", WELDED PIPE WITH FLANGES IS THE ONLY APPROVED JOINING METHOD.

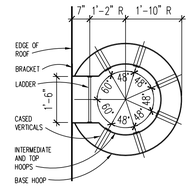
WATER COOLED CHILLER PIPING CONNECTIONS
19 H10 NO SCALE



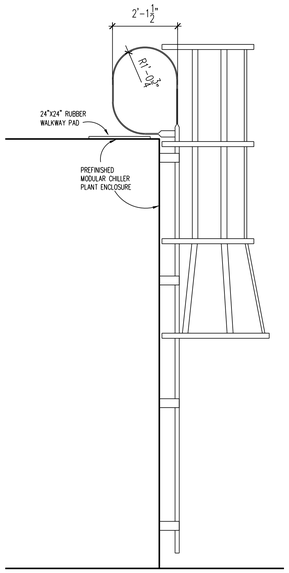
WALL MOUNTED ELECTRIC WATER HEATING PIPING DETAIL
15 H10 NO SCALE



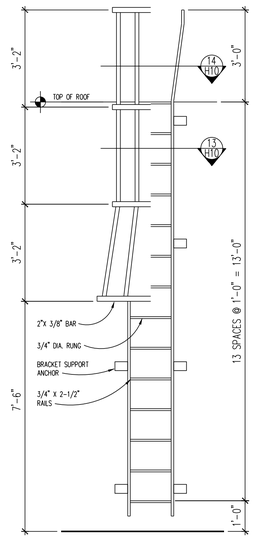
14 H10 PLAN AT TOP OF CAGED LADDER
1/2"=1'-0"



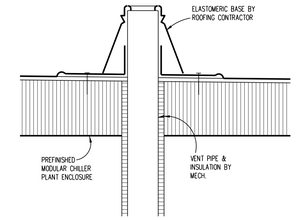
13 H10 SECTION AT CAGED LADDER
1/2"=1'-0"



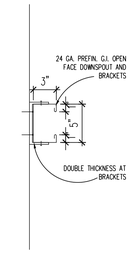
12 H10 CAGED ROOF LADDER
1/2"=1'-0"



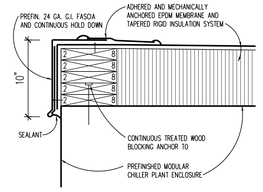
11 H10 CAGED ROOF LADDER
1/2"=1'-0"



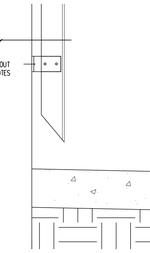
10 H10 VTR DETAIL
1 1/2"=1'-0"



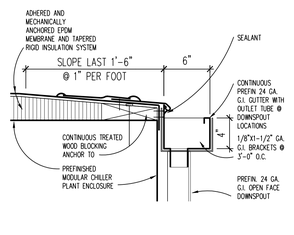
7 H10 DOWNSPOUT DETAIL
1 1/2"=1'-0"



9 H10 FASCIA/ROOF MEMBRANE DETAIL
1 1/2"=1'-0"



6 H10 DOWNSPOUT DETAIL
1 1/2"=1'-0"



8 H10 FASCIA/ROOF MEMBRANE DETAIL
1 1/2"=1'-0"

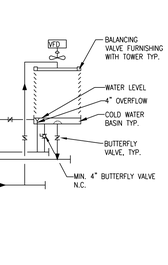
5 H10 PERSONNEL DOOR ELEVATION
1/4"=1'-0"

4 H10 SIGN ELEVATION
1 1/2"=1'-0"

3 H10 PARTIAL SOUTH ELEVATION
1/8"=1'-0"

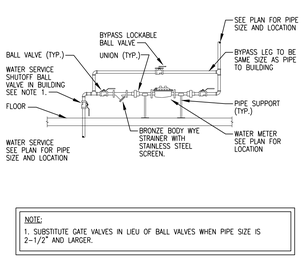
NOTES:
1. WALL TYPE SHALL BE FIELD VERIFIED. WALL TYPE MAY BE BRICK AND BLOCK, METAL STUD, WOOD STUD, METAL PANEL, ETC. MECHANICAL CONTRACTOR SHALL COORDINATE LOUVER INSTALLATION WITH GENERAL CONTRACTOR.

17 H10 LOUVER INSTALLATION DETAIL
NO SCALE



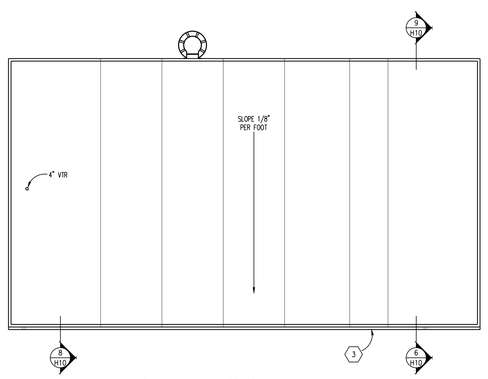
NOTE:
1. THE BASINS SHALL BE INTERCONNECTED BY FLUMES. EACH CELL SHALL BE PROVIDED WITH ITS OWN SUMP AND ANTI-CAVITATION PLATE.

MULTIPLE CELL COOLING TOWER-PIPING CONNECTIONS
18 H10 NO SCALE

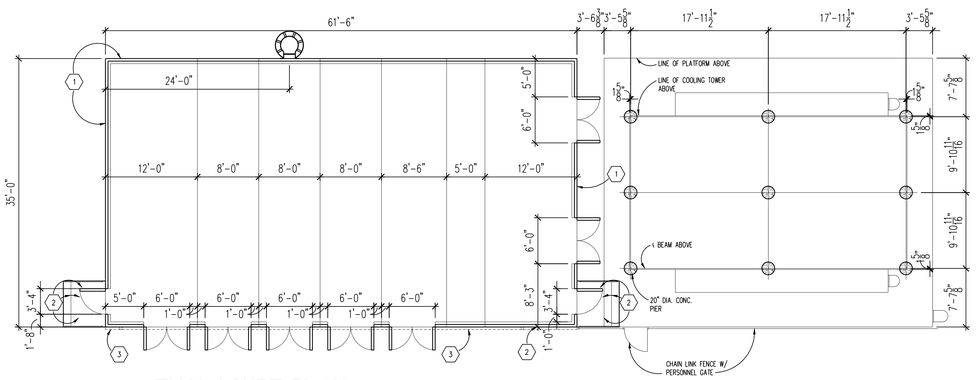


NOTE:
1. SUBSTITUTE GATE VALVES IN LIEU OF BALL VALVES WHEN PIPE SIZE IS 2-1/2" AND LARGER.

16 H10 WATER METER DETAIL
NO SCALE



2 H10 ENCLOSURE ROOF PLAN
1/8"=1'-0"



1 H10 ENCLOSURE PLAN
1/8"=1'-0"

ENCLOSURE NOTES:
1. EQUIPMENT ENCLOSURE PROVIDED BY MODULAR CHILLER PLANT. SECTION 23 64 10, TO INCLUDE INSULATED METAL FACED WALL AND ROOF PANELS ANCHORED TO FORMED STEEL FRAMING, FLOOR STRUCTURE, DOORS AND HARDWARE. ROOF SHALL BE FULLY INSULATED. SEE SPECIFICATIONS FOR MORE INFORMATION. SEE STRUCTURAL FOR CONCRETE FOUNDATION.
2. METAL GRATE LANDING, STEPS AND STEEL PIPE HANDRAIL BY CHILLER ENCLOSURE MANUFACTURER TO MEET OR EXCEED MINIMUM REQUIREMENTS OF OSHA AND NFPA 101 CHAPTER 40.
3. CONTINUOUS GUTTER WITH OPEN FACED DOWNSPOUT.

Revisions	Date

Dept. of Veterans Affairs
Health Care System
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MBN ENGINEERING, Civil & Electrical Engineers
SOLIEN & LARSON ENGINEERING, Structural Engineers

REGISTERED PROFESSIONAL ENGINEER
JOEL C. PECK
PE - 6847
DATE 12/18/2015
STATE OF NORTH DAKOTA

Drawing Title	ENCLOSURE PLANS AND MECHANICAL DETAILS
Project Title	REPLACE CENTRAL CHILLER PLANT
Date	DECEMBER 18, 2015
Scale	AS SHOWN
VA Project No.	437-14-111
Contract No.	VA263-P-1217 VA263-C-
Designed By	JCP
Checked By	JCP
Drawn By	JAF
Drawing No.	H10
Building No.	56
AutoCAD File Name	2013282-21-H10.dwg
Location	FARGO VA HEALTH CARE SYSTEM FARGO, ND
	Dwg. 21 of 26

Department of Veterans Affairs

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